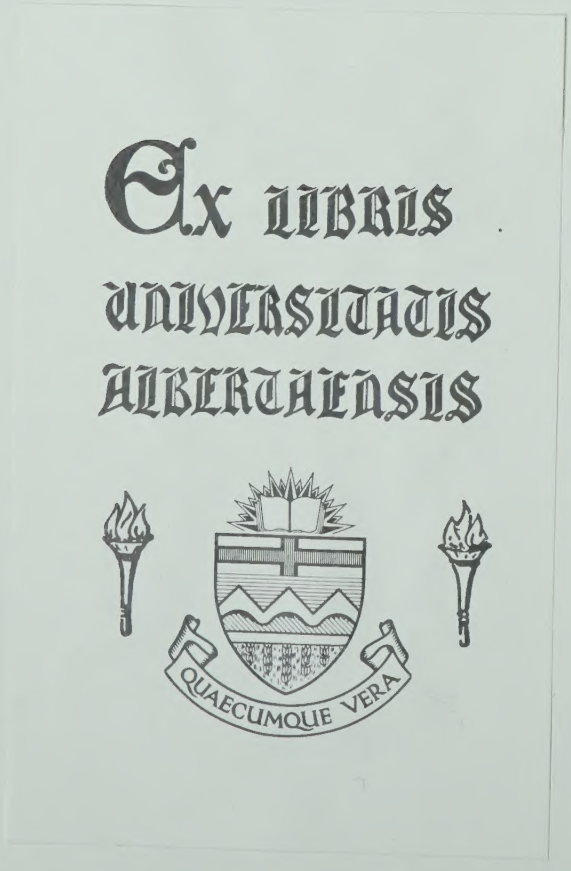


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# A CROSS-SECTIONAL STUDY OF REFLECTION-IMPULSIVITY WITH SPECIAL REFERENCE TO SEX, SOCIAL CLASS, AND MATERNAL CONCEPTUAL SYSTEMS

BY

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The undersigned certify that they have read and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled " A Cross-Sectional Study of Reflection-Impulsivity with Special Reference to Sex, Social Class, and Maternal Conceptual Systems," submitted by Stanley G. Souch in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

This investigation studies reflection - impulsivity of elementary school children. Research considerations necessitated the study of two separate samples. The first study, Sample One, entailed a cross-sectional analysis of reflection-impulsivity with special reference to sex and social-class; the second, Sample Two, investigated the relationship between cognitive styles of first-grade school children and their Mother's conceptual system.

Sample One consisted of 247 males and 248 females selected from grades one to six in two elementary public schools located in different socioeconomic areas in the city of Edmonton, Alberta. Subjects in Sample Two were comprised of grade one children and their mothers; these children however, were drawn from elementary schools located at Fort Saskatchewan, Alberta, a rural community located approximately twenty miles north-east of Edmonton.

Results of these studies revealed the following:

1. Neither Kagan's indices of reflection-impulsivity (latency and errors), nor response time alone showed a tendency for boys and girls to become more reflective as they grow older,

2. Impulsive boys and girls performed significantly more poorly than reflective boys and girls on a mathematics achievement test, but no differences were found between these groups on a standardized reading test,

3. Errors on response uncertainty tasks are related more to response time for boys and to IQ for girls although the difference in relationship failed to attain statistically significant levels,

4. Important and significant social class differences were found in children's cognitive style; significantly greater numbers of impulsive boys and girls came from lower socioeconomic homes, and

5. The reflective or impulsive orientation of first-grade children was found to be unrelated to the concrete-abstract dimension of their mother's conceptual system.

In addition to the foregoing, non-hypothesized considerations showed significant differences in intelligence quotient scores between reflective and impulsive children of both sexes. The direction of the difference favored reflective boys and girls. One of Kagan's "anomalous groups," a relatively small number of subjects who are both accurate and fast on response uncertainty tasks, had higher mean IQ scores than impulsive subjects. The difference between the "fast-correct" females and impulsive females was statistically significant.

Consistent sex differences obtained for MFF response time and error scores suggest that investigators should continue the practice of analyzing data separately for the sexes.

Implications based on the findings of this study argue convincingly that reflection-impulsivity is a cognitive style of some importance in child development. Future research in this area is seen as potentially rewarding.

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# CHAPTER I

## INTRODUCTION

The focus of much contemporary learning theory has been on the information - processing characteristics of the human organism. A number of orientations exist, each purporting to provide the most veridical model for explanatory and predictive purposes (for e.g. - Berlyne, 1965; Bruner, 1962; Piaget, 1963). Cognitive theories, in general, are uniform in their tacit acceptance of some decision-making procedure involved in thinking. When a learner is confronted with a problem situation, a seemingly unconscious sequential order of events is said to permit him to make some initial categorization of salient cues in the stimulus field, store the coded categorization and subsequently, through a series of operations, transform the encoded data (Bruner, 1957).

Kagan (1966a) specifically delineates five stages in a chronology of problem solving but delimits his investigations primarily to two phases: the selection of a likely hypothesis and its subsequent evaluation. Such a problem-solving order is consonant with Miller, Galanter and Pribram's concept of the TOTE unit (1960). It appears that one of Kagan's contributions is to have pointed up the possibility of individual differences in the speed with which such a test-operate-test-exit mechanism functions.

Stable individual differences, such as the conceptual tempo dimension isolated by Kagan, have recently received considerable attention from researchers. These variations in cognitive activity have been alternately

referred to in the literature as cognitive style (Kagan, Moss and Sigel, 1963; Witkin, Goodenough, and Karp, 1967) conceptual style (Hess and Shipman, 1965b), and learning style (DeCecco, 1968).

The study proposed here concerns itself with the reflection-impulsivity dimension, a variable which poses some interesting problems for both educational research and pedagogy. Educators to date have insufficient knowledge of the differential effects of an impulsive or reflective persuasion on learning and classroom performance. Also, the influence of this particular cognitive style at varying age and grade levels within diverse social strata has not been conclusively determined. The purpose of this study is directed towards clarifying these issues.

A secondary objective of this research is to explore the possible relatedness between maternal conceptual systems and the reflective or impulsive disposition of first-grade school children.

The first section of Chapter Two of this study will examine individual preferences for fast or slow decision times, the stability of such an orientation, and its generality across various cognitive tasks. Within this section, mention will also be made of some behavioral correlates of reflection - impulsivity. Part Two presents implications deduced from a review of the research, whereas Part Three provides an attempt at integrating reflection-impulsivity within a larger theoretical framework. Chapter Two concludes with the presentation of five testable hypotheses as they are derived from theory and research. Method and experimental design are

considered in Chapter Three and the results of this investigation are presented and discussed in Chapter Four. The findings of this cross-sectional analysis of reflection-impulsivity are summarized in the final chapter, which also includes a discussion of the relationship of these results to other studies of cognitive style. The implications of this study for future research completes the chapter.

# CHAPTER II

# REVIEW OF THE RESEARCH AND THEORETICAL FRAMEWORK

## 1 REFLECTION - IMPULSIVITY

### Background

Kagan, Moss and Sigel (1963) noted a general pattern amongst children of normal intelligence in their differentiation and analysis of external stimuli. Some children tended to respond to portions or sub-elements of a stimulus field while others characteristically reacted in terms of the global undifferentiated whole. Kagan, et al., (1963), noted the longer response times of children producing a preponderance of analytic concepts and inferred that these children used considerably more time to scan the stimulus field. The formation of nonanalytic concepts was associated with significantly faster response times.

A series of instruments was constructed in an attempt to obtain a measure of the decision-time variable. Research was thus stimulated as a result of a rather unintentional uncovering of a major antecedent in the production of analytic concepts in elementary school children. How-ever, before exploring the methods of measurement, it might be useful to examine Kagan's notion of reflection-impulsivity.

People with short decision times were termed impulsive; those with longer response times to decision were labelled reflective. Kagan (1965a) coined the phrase "conceptual tempo" to refer to the tendency to display

long or short decision times in reference to "problems with some degree of response uncertainty" (i.e., several response alternatives are available simultaneously or contiguously in time, and one must be selected) (Ibid., p. 143).

Numerous investigations revealed the amount of delay to be inversely related to errors. Consequently, the criteria for impulsivity became rapid response coupled with a high error score in a controlled situation of response uncertainty; conversely, the operational definition of a reflective disposition became one of delay with few errors (Kagan, Pearson and Welch, 1966).

Measurement

Conceptual Style Test. The CST consists of a set of 30 cards, each with three black-and-white drawings of familiar objects. The pictures are designed to elicit two main classes of responses: analytic and relational. An analytic concept is said to involve the pairing of objects on the basis of some component part of a total stimulus, whereas relational concepts are defined by a functional relationship between two stimuli. A third category of concepts, deemed by Kagan, et al., (1963), to be of lesser importance, was called inferential-categorical and was defined by an expressed similarity based on some inferred quality.

Delayed Recall of Designs. The DRT requires a subject to select from variations of geometric designs the form that he was previously shown.

Haptic-visual Matching. This test, hereafter referred to as the HVM

test, allows subjects to manipulate and haptically explore a three-dimensional wooden form hidden from view. After exploration, the subjects are asked to withdraw their hands and to select a visually presented pattern corresponding to the form palpated. No time limit is imposed.

Matching Familiar Figures. The MFF test consists of a familiar picture, the standard, and six to ten variants. Subjects are asked to select the stimulus that is an exact replica of the standard when both the standard and the variants are visually present.

The above measures represent the most often used and most reliable instruments for assessing response latency. Variables scored on the DRT and MFF are number of errors and average response time. The HVM tasks yields three variables: errors, response time, and palpation time. From the CST two variables are derived: the number of analytic concepts produced and mean response time to the initial concept.

The necessary criterion for constructing the problem situations under discussion is that a condition of response uncertainty be established in which a number of solutions are simultaneously available (Kagan, et al., 1963; Kagan, Rosman, Day, Albert and Phillips, 1964). By far the most effective technique for assessing an individual's conceptual tempo appears to be the Matching Familiar Figures test. A more detailed description of the MFF is presented in the following section of this paper.

Pervasiveness

Intertask generality. The Matching Familiar Figures test has proved

to be clearly the most sensitive index for measuring impulsivity-reflection. As mentioned previously, Kagan et al., (1966), proposed an alternative definition of the impulsive-reflective dimension by utilizing a combination of response time and errors. With the MFF as the key instrument, it was felt that purer groups would be created if impulsives were categorized as being both above the median on errors and below the median on response times for their sex. A reflective subject would be one below the median on MFF errors, and above the median on MFF response time.

Kagan (1965b) states that the "MFF has the greatest response uncertainty and yields the highest correlations with external criterion variables" (Ibid., p. 617). Test-retest reliability with grade-one children over a one-year period revealed adequate stability of response time. With a sample of forty-six boys and fifty-six girls, response time was correlated at .48 and .50 respectively ($p < .01$), whereas error scores were less stable for boys but satisfactory for girls ($r = .25$ and .51 respectively) (Ibid., p. 625).

Recognition-error scores and response time on the three basically perceptual tasks (DRT, HVM and MFF), performed over a twenty-month period by children in grades two to four, indicated a high intertask consistency. Correlations among response times on the tasks were significant in ten of twelve cases reported, and intercorrelations among error scores attained significance in seven of twelve cases (Kagan, 1966b).

Predictability. Support for the generality of a reflection-impulsivity

dimension can be found in the relationship between response time on one task and the prediction of errors on one of the other tests. Further to this, it has been found that children having either a reflective or impulsive disposition, as indicated by the MFF, have produced significantly different levels of performance on serial learning (Kagan, 1966a) and reading recognition tasks (Kagan, 1965b). Children classified as impulsive made more errors in reading English words than did reflective children. Also, reflective children performed considerably better than impulsive children in situations involving inductive reasoning (Kagan, et al., 1966). In the latter study, response uncertainty was considered present when a difficult item forced a child to generate mentally his own alternative solution hypotheses. In another experiment which required response alternatives to be generated mentally on a tachistoscopic task, response times to descriptions of the scenes were positively related to times on the MFF test (Kagan, 1965a).

Ward (1968) extended the study of reflection-impulsivity to kindergarten children and examined the generality of this cognitive style dimension through two additional variations in measurement of response uncertainty. Mean response latencies on a child's last six errors on the Peabody Picture Vocabulary Test, Forms A and B, and on five difficult items of a "Dots" test (estimations of dots on a card) provided a measure of reflection- impulsivity. An analysis of the data "offer(s) support for the generality and pervasiveness of reflection-impulsivity as a dimension of individual difference in cognitive style" (Ward, 1968, p. 872). Significant intercorrelations among response latencies were found, and latency and error scores were negatively correlated;

this is supportive of the Kagan studies.

Kagan (1966b) reports that concomitant with increases in the chronological age of children is a tendency to become more reflective. This is evidenced in increased latency scores and fewer errors. It is unlikely that this developmental trend towards increased reflectivity is an artifact of the measuring instrument since the tasks should be easier for older children. It may be that an individual's relative position would remain invariant within the general developmental trend. Yando and Kagan (1968) found that an adult form of the MFF discriminated well amongst a group of primary-grade teachers; there was virtually no overlap between groups because the fastest reflective teacher's average response time was twice as long as that of the slowest impulsive teacher.

From a review of the research, it appears that a penchant towards fast or slow decision times is a relatively stable dimension over time, demonstrates some generality over tasks, and tends to be predictive of cognitive functioning in the few areas investigated. Although the generality of reflection-impulsivity appears to have been adequately researched, the antecedents or "psychodynamics" of conceptual tempo have yet to attract the attention of investigators. An examination of the behavioral correlates of the reflection-impulsivity dimension may provide a basis from which additional links might be drawn.

## Correlates

Physiological. Kagan, et al., (1963) undertook extensive

longitudinal observations of children who had demonstrated a preference for analytical concepts. The investigators' comments on the characteristics of boys producing a preponderance of analytic concepts is worthy of consideration:

> The longitudinal observations corroborate the data on the relation between fast reaction times and a nonanalytic style and suggest that a nonanalytic child is more impulsive, less able to inhibit urges to action, more distractible, and less capable of intense involvement in intellectual tasks requiring concentration and motoric passivity. (Ibid., p. 108).

Other studies suggest that, for males at least, the inability to inhibit motoric discharge is inversely related to the production of analytic responses and future involvement in intellectual activities. In addition, data based on respiratory patterns revealed a general negative relation between analytic subjects and respiratory variability (Kagan, et al., 1963; Kagan, et al., 1964). Kagan and Rosman (1964) also noted that first and second grade boys who demonstrated a preference for nonanalytic concepts were less likely to exhibit cardiac and respiratory patterns characteristic of sustained attention than were boys possessing an analytic attitude. Elsewhere, Kagan (1967) finds some evidence in support of a neurophysiological basis of inhibition:

> Higher frequencies of anoxia, hyperbilirubinemia, and toxemia of pregnancy increases the risk of subtle damage to the brain stem centres and, therefore, insult to inhibition systems. The hyperkinesis of a child with brain damage is presumed to be a partial result of such insult and could be one of the determinants of conceptual impulsivity. (Ibid., p. 510).

In a study of sixty-one pairs of identical and fraternal grade school twins, Scarr (1966) found a moderate genetic contribution towards impulsivity as measured on the Fels Child Behavior Scales and for all measures of preferred reaction time. Scarr (1966) also noted that Vandenberg (1962) , using the Thurstone Temperament Schedule, found impulsivity to have a genetic basis to behavior.

Psychological. Repeated observations of various groups of impulsive grade school children (Kagan, et al., 1963; Kagan, 1965a) has led to a rather consistent cluster of characteristics being attributed to someone with a reflective or impulsive orientation. The reflective child seems to be concerned about the validity of his hypotheses as indicated not only by delay itself but by increased fixations of both the standard and variants on perceptual recognition tasks. The tendency to delay before responding is reported to be relatively independent of the verbal ability of the child, while a low negative relation is found between recognition errors and verbal ability (Kagan, 1965a, 1966b). There is some evidence to suggest that the reflective child is more persistent in the pursuit of intellectual goals (Kagan, 1965a, 1966a), while tentative support for the notion that reflectives are anxious over the possibility of committing an error is provided by Kagan, (1966a).

Social class. The relatedness of social class to reflection-impulsivity has not been adequately demonstrated. Kagan's (1967) observations of lower-class children suggest that as a group they have a tendency towards impulsivity. Kagan contends that the reason is partially biological in that the lower-class group

is reported to have a higher incidence of pre- and perinatal trauma. In the same study, it is further postulated that the lower-class child has low anxiety over failure, whereas the high anxiety of the middle-class child causes him to inhibit in order to evaluate the quality of his cognitive product thereby minimizing failure.

Bell (1968) hypothesized that social class differences in parental behavior might be partially the result of child behavior disorders involving hyperactivity. The research of Pasamanick, Robers and Lilienfeld (1965) and Pasamanick and Knobloch (1960) is cited by Bell as evidence of congenital factors associated with complications of pregnancy and delivery, and provides the further supposition that hyperactivity is more prevalent in lower classes and that males are more frequently affected. This line of theorizing is not dissimilar to that advanced by Kagan and others (1963, 1964, 1967) as reported in a preceding section of this paper.

Schwebel (1966) studied the effects of impulsivity on performance of verbal tasks of middle and lower-class children and found a tendency for children from a lower-class neighbourhood to be more impulsive in terms of response time than their middle-class counterparts. Schwebel's findings are to be treated with caution since the nature of his experimental design makes inference hazardous.

In a more recent study, Campbell (1968) reported a relationship between socioeconomic class and reflection-impulsivity. Students from the lowest socioeconomic area of his sample constituted the largest number of

impulsive subjects.

Yando and Kagan's (1968) findings are at variance with that reported above because they found social class membership to be unrelated to either latency or error scores on the MFF.

It would be of interest to determine the effect of age and sex differences in Campbell's and Schwebel's studies as opposed to Yando and Kagan's. In the latter's investigations, the sample was composed of grade one boys and girls, whereas the former studies focused on older populations which included males only. In view of the inconclusive nature of the previously cited findings, it is not yet possible to discern the importance of the social class variable. A logical extension of Kagan's work would be to examine the relationship between social class and reflection-impulsivity at various age levels.

Sex differences. In general, girls demonstrate higher relation between error scores and verbal ability than boys (Kagan, 1966b), are more stable over time in terms of delay and error scores on response uncertainty measures than boys (Kagan, 1965b), and display greater intertask consistency (Kagan, et al., 1966). On a serial-learning recall task, verbal ability showed a much more impressive relationship with recall for both impulsive and reflective girls than it did for boys; the performance of girls was less affected by threatening conditions (Kagan, 1966a). One plausible explanation for the latter event is that in the early school grades girls are more successful, rewarded more often, have more confidence and are therefore less affected by threat-producing situations.

Kagan (1965b) found that for grade one and two children, MFF latency was

reported to be the best predictor of reading error scores for boys while MFF errors were the best predictor for girls. Another study involving preschool children (Lewis, Rausch, Goldberg, and Dodd, 1968), found IQ to be a more important factor in predicting errors on a matching figures tasks for girls than for boys. Meichenbaum and Goodman's (1969) sample of kindergarten children showed females to be significanlty more impulsive than boys in terms of response time alone; no difference was found between sexes in number of MFF recognition errors. Ward (1968) tested children of similar age on a variety of response uncertainty tasks which included tests based on Kagan's MFF. He reported no sex difference for latency scores and only one significant difference for errors. It can be seen that while some studies investigating the possibility of sex differences in reflection-impulsivity have failed to report consistent results, at least one study (Lewis, et al., 1968) has cautioned "against pooling data across sex" (P. 568). Since sex differences have been found in other areas of cognition and personality, for example, tactile sensitivity (Bell and Costello, 1964), attention (Kagan and Lewis, 1965), infant vocalization (Kagan, 1969), category width (Wallach and Caron, 1959), and maternal-infant interaction (Moss, 1967) a separate analysis of data for male and female subjects in future studies of reflection-impulsivity seems warranted.

## II IMPLICATIONS DERIVED FROM A REVIEW OF THE RESEARCH ON REFLECTION - IMPULSIVITY

It has been shown that individual preference in decision time to

situations of response uncertainty are stable regardless of whether the task entails a fixed number of alternatives or requires subjects to generate response alternatives mentally. A reflective or impulsive persuasion tends to generalize to inductive reasoning tasks (Kagan, et al., 1966) and influences the quality of an individual's response in other areas as well [for example, reading ability (Kagan, 1965b) and serial learning (Kagan, 1966a)].

Since a reflective-impulsive cognitive style is predictive of errors on some school-related tasks for primary-grade children (Kagan, 1965b; Kagan, et al., 1966) it would be of educational significance to determine whether the impulsive child is at a continued disadvantage at increasing grade levels in different subject areas. Although Campbell (1968) found no significant difference in performance of impulsive and reflective sixth grade boys on a scholastic achievement battery, a recent study by Cathcart and Liedtke (1969) revealed that reflective grade two and three students (both sexes) scored significantly higher on a mathematics achievement test than did impulsive subjects. Finally, it must be noted that the investigation of the effects on a child's performance of a predominantly reflective or impulsive orientation has been limited to a relatively small number of subject areas and grade levels.

Data from two of Kagan's studies (1965a, 1966b) suggest a developmental tendency towards increasing response latencies and decreasing recognition errors with age. Kagan's (1965a) eighth grade subjects demonstrated significantly longer response times than either second or third grade children

on identical tachistoscopic recognition tasks. However, additional cross-sectional analyses need to be undertaken before we can accept Kagan's generalized statement that "these data are persuasive in suggesting that reflection over alternative hypotheses is a disposition that gains strength as the child develops" (Kagan, 1966b, p. 515).

Lewis, et al., (1968), hypothesized from Kagan's data on school children that number of errors on a matching figures task would tend to be more a function of response time for boys and more a function of IQ for girls. Using preschool children as subjects, Lewis and his colleagues found that girl's errors were related only to their intelligence. In the same study, the investigators compared their preschool data to that obtained by Kagan for subjects in grades one, three, and four (Kagan, et al., 1964; Kagan, 1965b). Across the four age levels the data consistently indicated no relationship between response time and IQ, whereas the trend for boys to show a larger correlation between response time and errors than girls was observed. Similarly, in two of three available grade levels, girls demonstrated a larger correlation between intelligence and number of errors. Ward's (1968) study of reflection-impulsivity in kindergarten children reported no effects of children's age, sex, or IQ within the sample although correlations between latency and error were higher for males and between IQ and error higher for females. Unfortunately, Ward did not employ a partialling procedure amongst latency and IQ to determine the most significant predictor of errors. Finally, as suggested by Lewis, et al., (1968), comparisions of errors, latency, and IQ must take into account differences in measurement of IQ as well as differences in the

tasks of response uncertainty. It is clear that further research is required to fully assess the consistency of sex differences across this cognitive style. Research implications with regard to social class and reflection-impulsivity have been discussed elsewhere (see page 11). Finally, a study of the antecedents of conceptual tempo may lead to greater insight for those interested in behavioral modification. Such a study, as suggested by Kagan, et al., (1964) will entail the establishment of a link between reflection-impulsivity and the larger stream of psychological theory.

## III REFLECTION-IMPULSIVITY AND A LARGER THEORETICAL FRAMEWORK

### Social Class and Cognitive Styles

Numerous studies involving social class (Bayley and Schaefer, 1960; Deutsch, 1965; Hess and Shipman, 1965; Olim, Hess and Shipman, 1967) have tended to focus on the interactive process between the mother and the child. Much research in socialization theory such as that of Hess and Shipman (1965a, 1965b), and more recently Moss, Robson, and Pedersen (1969), is based on the argument that early social experiences shape cognition and that the most important figure in the organization of these experiences for the child is the mother.

Lower-class mothers as a group have been found to employ different techniques of child rearing than middle-class mothers. The latter group has been found to concentrate more on "love-oriented" techniques, such as reasoning, appeals to guilt, and other methods involving the threat of loss of love ( Bronfenbrenner, 1958; Kamii and Radin, 1967). The lower-class

mother is said to be more inconsistent in discipline: she tends to rear "her children with a combination of leniency and impulsive aggressiveness" (Cavan, 1967, p. 54), and to utilize a more restrictive mode of communication (Bernstein, 1962, 1964; Deutsch, 1965; Hess and Shipman, 1965a, 1965b).

Hess and Shipman (1965a, 1965b) have suggested that a child's cognitive growth is fostered in family control systems which provide a wide range of alternatives of both thought and action, and that cognitive growth is constricted by systems of control which offer few opportunities for choice. Two distinct types of maternal control are postulated: one is oriented toward control by status appeal, the other is oriented toward persons. A person-oriented maternal style would permit the child to achieve behavior rules by presenting them in a specific context and emphasizing the consequences of alternatives. Status-oriented control typifies situations where rule-following is the norm and decision-making opportunities are few. Such control-systems are reflected in differential maternal linguistic codes:

> A status-oriented statement, for example, tends to offer a set of regulations and rules for conduct and interaction that is based on arbitrary decisions rather than upon logical consequences which result from selection of one or another alternatives. Elaborated and person-oriented statements lend themselves more easily to styles of cognitive approach that involve reflection and reflective comparision. (Hess and Shipman, 1965b, p. 873).

Elsewhere, Olim, Hess, and Shipman (1967), postulate marked social-class differences in approaches to control and discipline. Inhibitory and input-control techniques which are congruent with appeals to status, and

internalizing techniques congruent with a person-oriented appeal system, exemplify the dominant modes of control in lower-class and middle-class home environments respectively. Mothers using inhibitory procedures tend to sever thought and to discourage the weighing of alternatives, whereas input-control is felt to be more of an unintentional method due to a lack of information provided by the mother. Mothers in middle-and upper-class homes are more inclined to employ internalizing methods of control. A child exposed to an internalizing approach "will develop a higher level of conceptual thought . . (because) . . these children have been encouraged to compare and to sort, to select alternatives on the basis of some rationale" (Bernstein, 1962, p. 417).

Kamii and Radin's (1967) findings in their study of middle - and lower lower-class Negro mothers are similar to that reported by Hess and Shipman (1965a, 1965b) and Olim, et al., (1967). Kamii and Radin's observations of mother-child interactions showed that middle-class mothers resorted more often to bilateral child-rearing techniques than did lower lower-class mothers. Bilateral modes of influencing child behavior consisted of consulting, gently requesting, explaining, using psychological manipulations, sensitizing children to mother's feelings, and preventively reminding. By contrast, lower lower-class mothers most often utilized unilateral techniques such as commanding, bribing, and physically enforcing.

Conceptual Systems and Cognitive Styles.

The Conceptual Systems orientation of Harvey, Hunt, and Schroder

(1961) and Schroder, Driver, and Streufert (1967) is not inconsistent with the kind of socialization theory espoused by Hess and Shipman (1965a, 1965b)

The most important constructs in the personality theory advanced by Harvey, Hunt, and Schroder (1961) and further refined and elaborated by Schroder, Driver and Streufert (1967) are conceptual systems ordered along a concrete-abstract dimension. The terms concreteness - abstractness, according to Harvey (1967) refer "to a superordinate conceptual dimension encompassing such more molecular organizational properties as the degree of differentiation, articulation, integration and centrality of cognitive elements" (Ibid., p. 205). Development according to the Conceptual Systems framework is conceived as a progression towards greater abstract-ness along a concrete-abstract dimension in which are available alternative concepts or schemata for coping with the same stimuli. As progressive development occurs, the individual comes to view his environment less in categorical "either-or" terms.

Following from the work of Kelly (1955), Harvey, et al., (1961), postulate that a system of concepts serves as mediating links between the organism and the environment. Concepts in the form of subject-object ties operate as schemata, a filtering system "through which reality is read by the experiencing agent" (Ibid., p. 50). Concepts are said to develop through a process of differentiation - integration, a principle basic to Werner's (1948, 1963) conception of human development.

As indicated above, Werner's theory includes an orthogenetic principle which states that development proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation and hierarchic integration. The undifferentiated state is said to be developmentally prior to the differentiated one, which results in a polarity between subject and object. The influence of Werner's theorizing on the information-processing model of Schroder, et al., (1967), is exemplified in the following quotation from the latter's text: "the change from lower to higher levels of thought is a matter of degree, paralleling the evolutionary scale across species and developing with age (to an upper neurological limit under optimal environmental conditions) within species" (Ibid., p. 5). In Conceptual Systems theory the differentiation-integration principle defines the process through which concepts develop and attain some level on the concrete-abstract continuum. These levels of cognitive functioning are referred to as systems or stages.

In brief, the Conceptual Systems viewpoint conceives of development as a continuous process which under optimal environmental conditions proceeds in a given order to higher conceptual levels. Progression on the conceptual level dimension is seen as a series of successive stages, (denoted by a Roman numeral), and each stage is characterized by a specific interpersonal orientation and conceptual structure. If conditions are not optimal then a person remains at a lower conceptual level.

Descriptions of the four stage Conceptual Systems are found below as derived largely from the notations of Harvey, et al., (1961), Tuckman (1966a, 1966b), and Schroder, et al., (1967).

System I. These individuals are highly concrete as indicated by categorical thinking, rigidity, over-generalization, intolerance of ambiguity, and reliance on externally imposed structures such as norms, rules, and authority. The System 1 individual evidences the Piagetian kind of moral realism in a literal concern for rules and compliance with them.

Concrete structures at this level are characterized by compartmentalization; the integrating structure is absolute in that it lacks alternate interconnecting parts. For such a system, stimuli are interpreted and organized in a fixed way.

System II. These individuals are moderately concrete and negatively independent. A higher level of abstractness than that found in System I is considered largely due to experience with a training agent who is capricious in the dispensation of rewards and punishment. Such an unpredictable, unstructured environment develops in the child a rejection of authority and forced independence.

This moderately low structural level is known by "the presence of a conceptual apparatus that is able to generate alternate organizations of dimensions" (Schroder, et al., 1967, p. 18); however, there is a lack of such conceptual apparatus for relating or organizing different rules for

combining dimensions. Such a conceptual system is marked by a movement away from absolutism, in that there are no predetermined ways of interpreting enviroments, and yet the system lacks consistency in decision-making that would come from complex rules for integrating alternate schemata.

System III. Individuals classified as System III are next to the highest level of abstractness, and this stage is assumed to be the consequence of an overindulgent parent or parents. The moderately abstract System III individual is also characterized by an orientation toward people as a source of guidance and pleasure.

At this level the individual is able to effectively combine schemata so as to simultaneously consider different points of view.

System IV. This is the most abstract of the four systems, and individuals in this category are considered to be the product of a child-rearing environment conducive to exploratory, information-seeking behavior. Persons at this higher conceptual level have more intricate structures and interconnecting linkages for relating environmental input.

In summarizing the four systems in terms of a concrete-abstract dimension, it can be seen that Systems I and II best represent lower levels of abstractness whereas Systems III and IV are characteristic of higher levels of abstractness. One study (Wolfe, 1963) combined Systems I and II and Systems III and IV to obtain two categorically distinct conceptual level groups which were subsequently designated as concrete and abstract.

In Conceptual Systems theory, the parent, as the training agent, in creating a unilateral environment provides the child with "ready-made rules and controls his behavior via rewards and punishments until he learns the required response" (Schroder, et al., 1967, p. 47). Unilateral training is seen as inhibiting the emergence of alternate thoughts and actions and tends to restrict the development of structural properties of an abstract nature. The conceptual structure of a child exposed to unilateral training becomes arrested at a concrete stage of development. Alternatively, some parents create an interdependent training environment which maximizes children's discovery of alternate solutions. If consideration is given to the extremes of training environments along a continuum, it can be seen that unilateral conditions produce the development of concrete cognitive structures, while interdependent conditions are an important determinant of abstract structural properties (Harvey, et al., 1961; Schroder, et al., 1967).

Cognitive Styles, Social Class and Conceptual Systems

It can be argued that the arrestation of conceptual development as a consequence of unilateral training is a more salient condition of the lower-class home environment. Hunt and Dopyera (1966), using a sentence-completion method to obtain conceptual level scores of middle-and lower-class junior high school students, found the conceptual level of the lower-class group to be lower than the middle-class group. Prevalent among the lower-class group was a Sub 1 stage of conceptual development; individuals thus classified were "characterized by impulsivity and immaturity" (Ibid., p. 48). Accordingly,

Hunt and Hardt (1965) found a large number of delinquent boys at the Sub 1 and System 1 levels.

Hess and Shipman (1965a) found working-class mothers to have a preference for relational categories as measured by a conceptual style sorting task. Kagan, et al., (1963), found response time for relational categories to be typically shorter than for other categories, which is suggestive of less reflection over alternative possibilties. Hess and Shipman (1965b) also analyzed differences among social-status groups in terms of maternal teaching styles. Mothers were asked to teach their children to sort objects on the basis of specified attributes, and the linguistic and interactional styles of these mothers were then recorded. The findings indicated social-class differences in the ability of children to learn from their mothers; middle-class children performed better than lower-class children on both object sorting and verbal explanations of the basis on which they sorted.

Bernstein (1962) contends that particular linguistic codes are characteristic of different social structures. The codes are said to entail different verbal planning orientations which in turn control different modes of self-regulation and levels of cognitive behavior.

A more parsimonious conception of mother-child interactive effects on the cognitive style of children can be achieved by viewing certain kinds of maternal disposition as synonymous with conceptual functioning at concrete and abstract levels. The unilateral training environment of

Conceptual Systems theory (Harvey, et al., 1961; Schroder, et al., 1967) appears to be synonymous in terms of function with the status-oriented, inhibitory and input control techniques of the socialization theory postulated by Hess and Shipman (1965a, 1965b) and Olim, et al., (1967). The suggestion that status-oriented mothers would tend to function in a conceptually concrete manner and the tendency of person-oriented mothers to be conceptually abstract has already been made. Further, the probability appears greater for lower social-class mothers to be both status-oriented and conceptually concrete, whereas middle-class mothers are more likely to be both person-oriented and conceptually abstract.

Since status-oriented family control systems lead to "modes for dealing with stimuli and with problems which are impulsive rather than reflective" (Hess and Shipman, 1965b, p. 870), it could be concluded that a concrete maternal conceptual system is an important antecedent to impulsivity in children and that a predisposition towards impulsive behavior is more prevalent in lower socioeconomic classes. Supportive evidence for this contention comes from various sources. Bernstein (1962) found verbal hesitation to be independent of intelligence but associated with social class; working-class subjects spent less time pausing than their middle-class counterparts. Sieber and Lanzetta (1966) presented slides to abstract and concrete subjects tachistoscopically and discovered that abstract persons searched more for information and took more time in processing information.

In other words, concrete individuals were found to make faster decisions in a situation of response uncertainty.

A more psychologically explicit model congruent with that immediately presented would also help in an attempt to explain mother-child interaction as an antecedent of impulsivity-reflection. The modeling influence of a parental figure is sufficiently documented by Bandura and Walters (1963), and a theory such as this, which suggests that the child is differentially reinforced for adopting particular rules for processing information, is in agreement with the work of Gibson (1963) and Skinner (1953). A cognitive style may thus be developed which would be consistent with Kagan's notion of reflection-impulsivity (Kagan, et al., 1964; Kagan, 1965a; Kagan, et al., 1966).

## IV HYPOTHESES

It will be recalled from a review of the literature that a predisposition towards an impulsive or reflective cognitive style may be of some academic relevance. However, the scarcity of adequate research on a number of related variables leaves the full significance of Kagan's theory questionable. The present study has been designed to focus on a number of such neglected areas and to explore the relationship of these variables to the impulsive-reflection dimension.

The following hypotheses can be logically derived from both theory and related research:

1. For both boys and girls there is a trend towards increased reflectivity with age.

2. Impulsive boys and girls will perform more poorly on tests of scholastic achievement than will reflective boys and girls.

3. Errors on a task of response uncertainty are related more to latency for boys and to IQ for girls.

4. Social class is significantly related to reflection-impulsivity.

5. Conceptual abstractness of mothers is related to reflectivity of children.

# CHAPTER III

# METHOD AND EXPERIMENTAL DESIGN

## 1. THE SAMPLES

Sample One.

Subjects in the major portion of the study were children from two diverse socioeconomic areas of the city of Edmonton. Children in classrooms from grades one to six inclusive were drawn from an elementary public school located in each district deemed to be representative of higher and lower-class social-status levels. Kupfer's (1967) demographic analysis of Edmonton was used as a basis for delimiting the geographic areas within which the schools were subsequently selected. The determining factors in Kupfer's survey were education, income, housing, occupation, and fertility levels. In addition to this, Blishen's (1967) socioeconomic index was administered to provide quantitative confirmation that Sample One subjects drawn from school 1 and school 2 were representative of individuals from lower (LSES) and higher (HSES) socioeconomic status areas respectively.

A total of thirty male and thirty female subjects were selected at random from grade one classes in each of the two schools so designated as LSES (school 1)and HSES (school 2). Similarly, twenty-five male and twenty-five female subjects were randomly drawn, at each additional grade level up to and including grade six, from each of the two schools as indicated above.

Sample Two.

This sample consisted of 61 male and 66 female subjects from five

grade one classrooms at two elementary schools in Fort Saskatchewan, Alberta. Although the social class of subjects in Sample Two was not relevant to the testing of hypothesis 5, a cursory observation of father's occupations suggested that the subjects were generally of a mid socioeconomic level.

## II TESTING INSTRUMENTS

The Matching Familiar Figures test, which has been described on page six, has been found to be the most reliable index of response uncertainty (Kagan, 1965b). In the administration of the test, subjects were shown a familiar picture (the standard) and six stimuli, only one of which was identical to the standard. Each subject was asked to point to the picture that was a duplicate of the standard; the standard and the alternatives were clearly visible to subjects at all times. A record was kept of the total number of errors for each item up to a maximum of six errors, and latency to first response to the nearest half-second.

Interpersonal Topical Inventory is an objective measure of integrative complexity developed by Tuckman ( 1966a) which can be considered an adequate substitute for the usual projective test of complexity referred to in the studies of Schroder, et al., (1967). In conceptual Systems theory as espoused by the latter investigators, "the systems types lie on a concrete to abstract information-processing dimension where concrete and abstract refer to the level of integrative complexity of the concepts used for mediating between environmental inputs and appropriate responses" (Tuckman, 1966b, p. 656). Concrete concepts represent simple stimulus-response associations while abstract concepts link

"integrated stimulus configurations" to a variety of response alternatives. The ITI is a forced-choice instrument in which subjects are asked to choose the one item of thirty-six pairs of items that is most representative of their feelings or reactions to an interpersonal situation. There are a total of seventy-two alternatives, eighteen of which fall into each of the four conceptual systems, and a subject's score for any one system may reach a maximum of eighteen (Shaw, 1968). Tuckman (1966a) reported a contingency coefficient of .54 between the ITI and Schroder's Sentence Completion Test (SC), and Gardiner (1968) found a correlation of .57 between the ITI and SC. Gardiner developed a slightly different scoring system for the ITI which involved a continuous distribution of scores.

The revised scoring procedure consisted of noting the number of times subjects choose the more complex response of each pair of alternatives by assigning a score of +1 for each more-complex choice and -1 for each less-complex choice. These scores will yield a possible range of +36 to -36, with the positive scores indicating high integrative complexity. As to the rationale for this procedure Gardiner (1968) states that:

> Scoring the ITI in this manner can be justified on the grounds that an integratively-complex person should show a consistent tendency to choose more complex over less complex responses. Similarly, a person of low complexity should consistently choose alternatives of relatively low complexity. (Ibid., p. 43).

The scoring method of the ITI employed in this study was the one advocated by Tuckman (1966a, 1966b) since the number of subjects excluded

by this procedure proved to be relatively small and two sets of norms had been established for classification purposes. A subject is placed into the system in which he scores in the 8th, 9th, or 10th decile providing he scores in a lower decile in the other systems. Unclassifiable subjects are those scoring equally high in more than one system.

Blishen's Canadian Occupational Scale (1967) was used to document social-class differences in the two populations selected for study in Sample One. Blishen's (1958) scale, based on 1951 census figures, showed a rank correlation coefficient of .96 between it and a later scale based on the 1961 census. The 1967 scale was chosen for use in this investigation since many occupations characteristic of males in todays technologically-oriented labor force were included; therefore a number of female occupations such as nursing, which were included in the 1958 index, are found in the 1967 version only if they have male incumbents (Blishen, 1967, p. 12). Elley (1961) found Blishen's scale to function adequately for assessing socioeconomic status in the Edmonton area while research has shown occupational classification to be a useful index of social class (Kahl and Davis, 1955; Lawson and Boek, 1960). The Blishen scale scores range from 25.36 to 76.69 for a total of 320 occupations.

Measures of intellectual ability. Lorge-Thorndike Intelligence Tests were administered to all subjects in Sample One from grades one to six inclusive. Lorge-Thorndike Tests level 2, Form A, were selected for use in the lower grades, and Level 3, Form A Verbal Battery for the senior elementary grades.

Metropolitan Achievement Tests (1959) reading portion, were given to all subjects in Sample One. The tests used were administered at four levels according to student grade, and all raw scores were converted to standard score form. The series consisted of reading selections followed by several questions designed to measure different aspects of reading comprehension. Time limits at each level proved to be generous, thus little premium was placed on speed of reading in test construction.

Seeing Through Arithmetic, a school system-wide mathematics final examination based on STA textbooks currently used in the classroom, provided the examiner with scores of mathematics achievement. The raw scores for Sample One subjects were transformed to standard T scores with a mean of 50 and standard deviation of 10.

A pictorial illustration of the MFF will be found in Appendix B along with a copy of Tuckman's Interpersonal Inventory.

## III PROCEDURE

### Sample One

Subjects lacking scores on any variable for Sample One were deleted from statistical analysis. A number of children from school 1 (LSES) were unclassifiable in terms of a Blishen numerical score since they were products of either fatherless or unemployed-parent homes.

TABLE 1

SAMPLE ONE, DESCRIPTIVE DATA

| Grade | MALES | | | FEMALES | | | Combined Total |
|---|---|---|---|---|---|---|---|
| | School 1 | School 2 | Total | School 1 | School 2 | Total | |
| 1 | 29 | 26 | 55 | 23 | 24 | 47 | 102 |
| 2 | 21 | 18 | 39 | 19 | 17 | 36 | 36 |
| 3 | 21 | 17 | 38 | 19 | 21 | 40 | 78 |
| 4 | 15 | 20 | 35 | 18 | 20 | 38 | 73 |
| 5 | 21 | 19 | 40 | 23 | 23 | 46 | 86 |
| 6 | 21 | 19 | 40 | 21 | 20 | 41 | 81 |
| | 128 | 119 | 247 | 123 | 125 | 248 | 495 |

Data for both males and females in Samples One and Two are reported separately since there appeared to be little justification at the outset to combine sexes and considerable theoretical rationale to treat them separately.

As previously indicated, the MFF was used to provide a measure of reflection-impulsivity. The major variables scored were average response time to first selection across the twelve-item test and total number of errors. A frequency distribution of error and latency was then tabulated separately by sex for the entire sample. The procedure used to classify subjects into reflective and impulsive groups was that advocated by Kagan (1965b, 1966b) and used by others in subsequent research (for example, Campbell, 1968, Meichenbaum and Goodman, 1969). A subject was categorized as reflective if his MFF latency score was above the median of the sample and MFF error below the median. Contrariwise, a subject was deemed to be impulsive if his MFF latency score was below the sample median and MFF error score above the sample median. However, unlike prior studies

investigating reflection-impulsivity, subjects of mixed classification were not excluded from analysis. Findings for individuals scoring above or below the median on both time and error are reported in Chapter IV under Non-Hypothesized Results.

Two standardized tests of academic achievement, the Metropolitan Achievement Tests (MAT) and Seeing Through Arithmetic Tests (STA), provided measures of reading and mathematics. Intelligence quotient scores, social class ratings, and chronological age in months were obtained for all subjects in Sample One.

Sample Two.

Grade-one subjects in this sample were individually administered the MFF and categorized as reflective or impulsive according to the criteria indicated above. The mothers of the purely impulsive and reflective children were then mailed ITI questionnaires. There were 31 returns from a total of 41 ITI forms sent to the mothers of the impulsive and reflective boys. One questionnaire was completed incorrectly, leaving equal returns from mothers of children of each cognitive style. Mothers of 23 impulsive and 23 reflective girls were similarly mailed ITI questionnaires; the returns for the groups were 15 and 16 respectively. Mothers classified as System I and System II were combined to permit a larger conceptual grouping termed "concrete"; whereas mothers classified as System III and System IV were similarly combined to form a conceptually abstract grouping.

Chronological age in months and Otis IQ scores were provided by teachers for all subjects in Sample Two.

## IV. OPERATIONAL DEFINITIONS AND SUMMARY OF MAJOR VARIABLES.

Cognitive style refers to a reflective or impulsive disposition.

Reflective is a cognitive style defined by scores on the MFF that are above the median on response time and below the median on errors.

Impulsive is a cognitive style defined by scores on the MFF that are below the median on response time and above the median on errors.

Latency is the average response time in seconds (to the nearest half-second) to first response for all tasks on the MFF. In this study the term "response time" is used synonymously with latency.

IQ is the score obtained on a standardized intelligence test.

Sex male or female.

Age is chronological age in months, calculated to the nearest month.

Scholastic achievement is defined as the scores obtained on the reading section of the Metropolitan Achievement Tests (MAT) and the textbook - based Edmonton Public School Board Seeing Through Arithmetic Test.

Social class is defined by the score obtained on the Blishen Canadian Occupational Scale and by a public elementary school selected within each area designated by Kupfer's (1967) sociological analysis of the city of Edmonton as representative of upper and lower socioeconomic strata.

Conceptually abstract is defined by a score on the ITI which places a subject in either Systems 3 or 4 according to Tuckman's (1966) norming procedure.

Conceptually concrete is defined by a score on the ITI which places a subject in either Systems 1 or 2 according to Tuckman's (1966) norming procedure.

## V. STATISTICAL ANALYSES

The following statistical models were used to test the hypotheses:

Hypothesis 1. For both boys and girls there is a trend towards increased reflectivity with age. Reflectivity and impulsivity were treated as categorical variables and age as a continuous variable, and a point biserial correlation was computed to assess the degree of relationship between the stated variables.

Hypothesis 2. Impulsive boys and girls will perform more poorly on tests of scholastic achievement than will reflective boys and girls. A two-way analysis of variance, with grade level and cognitive style (impulsive-reflective) as independent variables and mathematics and reading scores as dependent variables, was computed to test the validity of this hypothesis.

Hypothesis 3. Errors on a task of response uncertainty are more related to latency for boys and to IQ for girls. Product moment correlations between MFF errors and MFF response time and between MFF errors and IQ were calculated separately for the sexes. The significance of the difference

between correlation coefficients $r_1$ (male, error and latency) and $r_2$ (female, error and latency) and $r_1^1$ (male, error and IQ) and $r_2^1$ (female, error and IQ) was then tested using Fisher's Z transformation (Ferguson. 1959 p. 153).

Hypothesis 4. Social class is significantly related to cognitive style. It was possible to treat social class and cognitive style as dichotomous variables, thereby enabling a chi square test of independence to determine the relationship between social class and reflection-impulsivity.

Hypothesis 5. Conceptual abstractness of mothers is related to reflectivity of children. Abstractness of mother and reflectivity of child were categorized for statistical purposes as dichotomous variables; the relationship between the variables was assessed by the chi square test.

# CHAPTER IV

## RESULTS AND DISCUSSION

## TESTS OF HYPOTHESES

### Sample One

For female subjects, combining grades (N = 248), the median for response time on the MFF was 100.0 seconds and the median error count 11. Of this group, 92 individuals were classified as impulsive and 83 as reflective, subjects of mixed classification numbered 73. Median scores for all males across grade levels (N = 247) were 90.5 and 13 for time and errors respectively. Eighty-two males were categorized as impulsive, 75 as reflective, and 90 mixed.

When impulsive and reflective groupings were determined by scores on major MFF variables according to grade level and sex, then a not too different situation prevailed in terms of total number of individuals in each of the impulsive, reflective, and mixed categories (see Tables A and B, Appendix A).

Hypothesis 1. The first hypothesis predicted that for both boys and girls there is a trend towards increased reflectivity with age. Biserial correlations were computed using reflectivity as a categorical variable and age as a continuous variable. Hypothesis 1 was not confirmed in that no positive linear relationship was found between age and reflectivity for either male or female subjects.

Correlations were .08 for males and .11 for females. Developmentally, changes in error scores on the MFF indicate a clear positive relationship with age. As shown in Figures 1 and 2, the MFF tasks appear easier for the older child since he tends to make fewer errors. However, when latency is defined as time taken to first response on the MFF, the findings of this study do not suggest a "disposition favoring reflection over alternative solution hypotheses . . (that) . . grows stronger as the child matures" (Kagan, 1966b, p. 498). From Figures 3 and 4, it can be seen that even if reflectivity were synonymous with response time alone, regardless of errors, then males in this sample are most reflective, in descending order, in grades two, three, and four. Similarly, in this study, females exhibit the most delay before responding to MFF items in grades two, three, and four as well. It appears that children of both sexes are as impulsive in grade six as they are in grade one.

Thus while the findings of this study are supportive of Kagan's research on the MFF error scores, discrepancies do exist between the studies with regard to developmental changes in response time.

Hypothesis 2. The second hypothesis predicted that impulsive boys and girls would score lower on tests of scholastic achievement than would reflective boys and girls. A two-way analysis of variance was calculated separately for the sexes; as can be seen from Table 2, hypothesis 2 was only partially supported. Impulsive male and female subjects in Sample One performed significantly more poorly on a mathematics achievement test than did subjects of a reflective disposition.

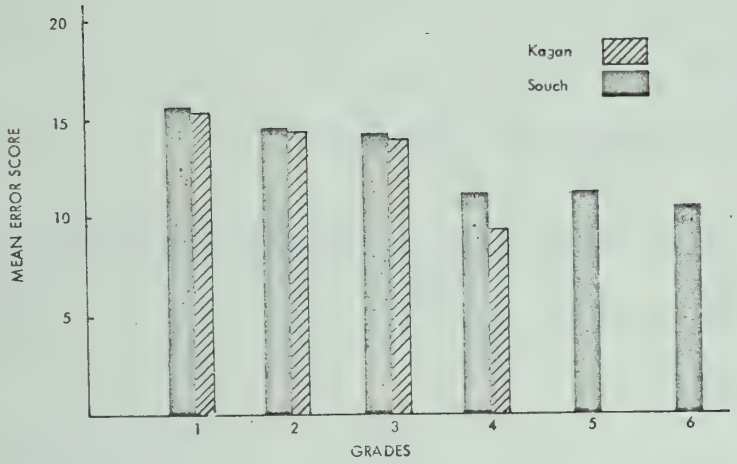


Figure 1. Developmental Changes in Error Scores: Males

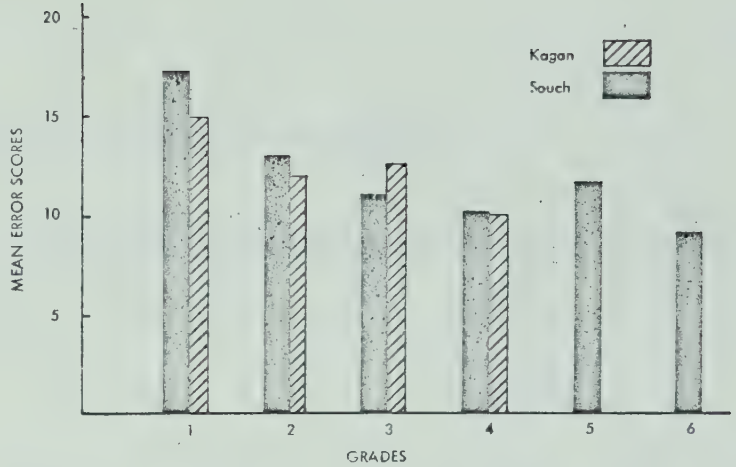


Figure 2. Developmental Changes in Error Scores: Females

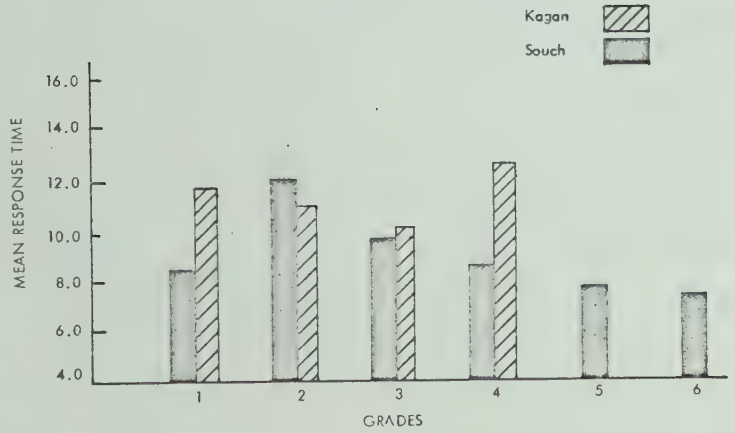


Figure 3. Developmental Changes in Response Time: Males

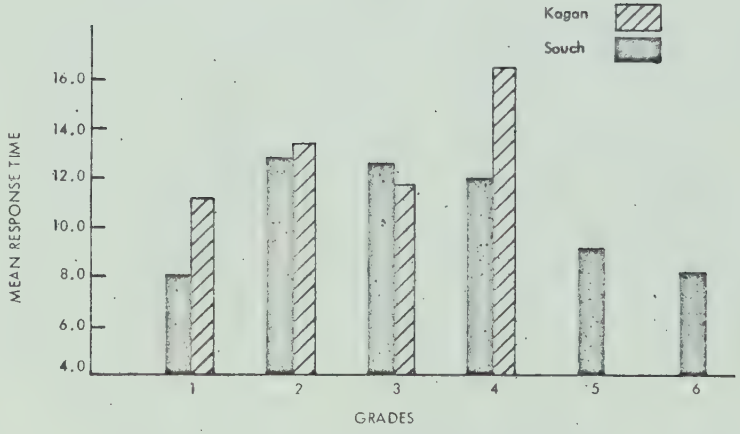


Figure 4. Developmental Changes in Response Time: Females

TABLE 2

SAMPLE ONE

SUMMARY OF ANALYSIS OF VARIANCE FOR SCHOLASTIC ACHIEVEMENT

| Source | SS | df | MS | F | P | SS | df | MS | F | P |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MALES | | | | | FEMALES | | |
| Variable 1: Reading | | | | | | | | | | |
| A Grade levels | 33253.600 | 5 | 665.072 | 0.7572 | 0.5818 | 6072.120 | 5 | 1214.420 | 1.3595 | 0.2424 |
| B Impulsive - reflective | 362.182 | 1 | 362.182 | 0.4123 | 0.5216 | 111.629 | 1 | 111.629 | 0.1249 | 0.7241 |
| Error | 149310.000 | 170 | 878.295 | | | 142027.000 | 159 | 983.252 | | |
| Variable 2: Math | | | | | | | | | | |
| A Grade levels | 582.381 | 5 | 116.476 | 1.1412 | 0.3405 | 344.963 | 5 | 68.992 | 0.7788 | 0.5663 |
| B Impulsive - reflective | 1512.870 | 1 | 1512.870 | 14.8226 | 0.0001 | 2209.640 | 1 | 2209.640 | 24.9447 | 0.0000 |
| Error | 17351.000 | 170 | 102.065 | | | 14084.400 | 159 | 88.581 | | |

Previous research (Kagan, 1965b) has found word-recognition errors to be negatively correlated with response time on the MFF for grade-one children of both sexes ($p < .01$). It appears that a marked difference may exist in the cognitive processes involved in oral reading and those involved in silent reading. The Reading Section of the Metropolitian Achievement Tests used in this study is designed to measure various aspects of reading comprehension, such as the ability to determine the main thought of a passage; to understand the literal meaning of a selection; to visualize relationships among ideas; to make correct inference; and to determine the meaning of words from context. As well, the MAT Reading test places little premium on speed, which is in contrast to the expectations conveyed to students when asked to read a paragraph aloud, as was the case in Kagan's (1965b) investigation.

Although an impulsively oriented child makes frequent errors in oral reading (for example, partial identity and suffix errors, meaningful and non-meaningful substitutions), his tendency to do so may be temporary. In any event, such errors may have no relationships with his skill in silent reading.

Hypothesis 3. It was hypothesized that errors on a task of response uncertainty, in this instance the MFF, are related more to response time for boys and more to IQ for girls.

Across all grade levels, the relationship between latency and errors for males was found to be -0.325 and between IQ and errors -0.229. For all female subjects, product moment correlations between latency and errors were -0.303 and between IQ and errors -0.311. Overall, the size of the correlation coefficients were in the expected direction; a larger correlation was obtained between errors and response time for males and errors and IQ for females. None of the differences, however, were significant (p. 153, Ferguson).

Developmentally there appeared to be no discernible trend for either boys or girls amongst the major MFF variables. Observation of latency and errors as shown in Table 3 reveals that for the males significant correlations existed for five of the six grade-levels ($p < .01$), with the remaining grade level approaching significance. For females an almost similar situation prevailed, with five of six grade-levels reporting significant correlations (four with $p < .01$; one with $p < .05$). With regard to the relationship between MFF errors and IQ, for the males a significant correlation was found only at the fifth grades; the third and sixth grades approaching significance.

It appears that for the girls in this study, verbal IQ scores account for more variance in terms of predicting MFF errors than is the case for the boys (i.e. larger correlations in five of six cases). The inclusion of both latency and IQ, however, adds significantly to the prediction of MFF errors ($p < .01$) for both sexes.

TABLE 3

SAMPLE ONE

INTERCORRELATIONS OF MAJOR MFF VARIABLES BY GRADE

| | | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|---|
| Grade | Variables | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| 1 | 1. Age | - | | | | - | | | |
| | 2. Latency | 0.123 | - | | | 0.173 | - | | |
| | 3. Errors | -0.267* | -0.657** | - | | -0.081 | -0.410* | - | |
| | 4. IQ | -0.221 | 0.176 | -0.194 | - | -0.081 | 0.124 | -0.188 | - |
| 2 | 1. Age | - | | | | - | | | |
| | 2. Latency | 0.001 | - | | | 0.098 | - | | |
| | 3. Errors | 0.010 | -0.301 | - | | -0.069 | 0.133 | - | |
| | 4. IQ | -0.220 | -0.037 | -0.148 | - | -0.093 | 0.068 | -0.151 | - |
| 3 | 1. Age | - | | | | - | | | |
| | 2. Latency | -0.157 | - | | | -0.039 | - | | |
| | 3. Errors | 0.025 | -0.425** | - | | 0.050 | -0.622** | - | |
| | 4. IQ | -0.136 | 0.197 | -0.228 | - | -0.383* | 0.339* | -0.282 | - |
| 4 | 1. Age | - | | | | - | | | |
| | 2. Latency | -0.190 | - | | | -0.026 | - | | |
| | 3. Errors | 0.140 | -0.429** | - | | -0.056 | -0.602** | - | |
| | 4. IQ | -0.246 | 0.029 | -0.102 | - | -0.075 | 0.129 | -0.315* | - |
| 5 | 1. Age | - | | | | - | | | |
| | 2. Latency | -0.138 | - | | | 0.252 | - | | |
| | 3. Errors | 0.323* | -0.442** | - | | -0.105 | -0.578** | - | |
| | 4. IQ | -0.496** | 0.118 | -0.409** | - | -0.465** | 0.186 | -0.418* | - |
| 6 | 1. Age | - | | | | - | | | |
| | 2. Latency | 0.043 | - | | | -0.066 | - | | |
| | 3. Errors | -0.113 | -0.574** | - | | 0.291 | -0.511** | - | |
| | 4. IQ | -0.610** | 0.129 | -0.166 | - | -0.473** | 0.119 | -0.283 | - |

* $p < .05$
** $p < .01$

Hypothesis 4. The fourth hypothesis stated that a social-class bias exists with respect to impulsivity. It was expected on the basis of both past research and existing theory that impulsivity would be predominant in the lower socioeconomic strata of the sample population.

As indicated earlier Sample One subjects were drawn from elementary schools in widely separated socioeconomic areas of the city of Edmonton. Mean Blishen scale scores for subjects from School 1 (LSES) and School 2 (HSES) were 32.61 and 65.72 respectively. The difference in Blishen scale means for the two schools was found to be significant beyond the .01 level.

Having provided concurrent validity that the initial samples were indeed representative of two diverse socioeconomic areas, it was possible to test hypothesis 4 using a non-parametric approach by treating subjects from Schools 1 and 2 categorically. Table 4 depicts the significantly greater number of impulsive children in the lower social class group; conversely, the significant over-representation of reflective subjects in the higher socioeconomic group is also illustrated.

TABLE 4

SAMPLE ONE

RELATIONSHIP BETWEEN COGNITIVE STYLE AND SES FOR MALES AND FEMALES

| | Socioeconomic status | | |
|---|---|---|---|
| Cognitive Style Males | School 1 | School 2 | Total |
| Impulsive | 54 | 28 | 82 |
| Reflective | 28 | 47 | 75 |
| | 82 | 75 | 157 |
| | Chi square = 12.771<br>df = 1 Prob. < .01 | | |

| | Socioeconomic status | | |
|---|---|---|---|
| Cognitive Style Females | School 1 | School 2 | Total |
| Impulsive | 61 | 31 | 92 |
| Reflective | 27 | 56 | 83 |
| | 88 | 87 | 175 |
| | Chi square = 19.910<br>df = 1 Prob. < .01 | | |

*School 1 (LSES)
School 2 (HSES)

Sample Two

The total number of female subjects in Sample Two (grade one, Fort Saskatchewan) was 66, of which 23 were impulsive, 23 reflective, and 20 of mixed classification. Twenty-one males were found to be impulsive whereas reflective and mixed categories each totalled 20. Means, standard deviations, and product moment correlations for major MFF variables are shown in Tables 5 and 6.

Hypothesis 5. This hypothesis predicted a relationship between conceptual abstractness of mothers and reflectivity of children. The abstractness of the mother's conceptual system was determined by scores on the ITI, and reflectivity was defined in terms of both response time and errors on the MFF.

A 2 x 2 contingency table was constructed and a chi square test for independence calculated. Table 7 shows the relationship between mothers' concrete or abstract conceptual system and their children's reflective or impulsive cognitive style. The data provides no evidence in support of hypothesis 5 since a significant chi square was not obtained. It appears that any effect a mother's stage of cognitive orientation may have on her children with regard to their preferred mode of decision-making speed has not been determined by the measures employed in this study.

TABLE 5

MEANS AND STANDARD DEVIATIONS OF MAJOR VARIABLES FOR SAMPLE TWO

| | Males (N = 61) | | Females (N = 66) | |
|---|---|---|---|---|
| Variable | Mean | S.D. | Mean | S.D. |
| MFF Latency (to nearest half second) | 127.21 | 73.76 | 140.62 | 98.87 |
| MFF Errors | 17.11 | 6.69 | 15.34 | 6.99 |
| Age (in months) | 76.27 | 5.07 | 76.39 | 4.10 |
| IQ (Otis) | 111.45 | 15.47 | 112.48 | 14.78 |

TABLE 6

INTERCORRELATIONS AMONG VARIABLES FOR SAMPLE TWO

| | Males | | | |
|---|---|---|---|---|
| Variables | 1 | 2 | 3 | 4 |
| 1. Latency | - | | | |
| 2. Errors | - 0.395** | - | | |
| 3. Age | 0.121 | 0.117 | - | |
| 4 IQ | 0.032 | 0.201 | 0.066 | - |

| | Females | | | |
|---|---|---|---|---|
| Variables | 1 | 2 | 3 | 4 |
| 1. Latency | - | | | |
| 2. Errors | - 0.481** | - | | |
| 3. Age | 0.037 | - 0.098 | - | |
| 4. IQ | 0.058 | - 0.250* | 0.107 | - |

* $p < .05$
** $p < .01$

TABLE 7

SAMPLE TWO

RELATIONSHIP BETWEEN MATERNAL CONCEPTUAL SYSTEMS AND COGNITIVE STYLE (BASED ON COLLEGE NORMS)

| Cognitive Style Males | Maternal Conceptual Systems | | Total | Cognitive Style Females | Maternal Conceptual Systems | | Total |
|---|---|---|---|---|---|---|---|
| | Concrete | Abstract | | | Concrete | Abstract | |
| Impulsive | 6 | 7 | 13 | Impulsive | 5 | 8 | 13 |
| Reflective | 7 | 7 | 14 | Reflective | 6 | 8 | 14 |
| | 13 | 14 | 27 | | 11 | 16 | 27 |
| | $\chi^2 = .0399$ | Prob. $> .05$ | | | $\chi^2 = .0539$ | Prob. $> .05$ | |

## NON - HYPOTHESIZED RESULTS

### Reflective, impulsive, and mixed classifications

Purest measures of the reflection-impulsivity construct are obtained through a median split on the major MFF variables: response time and errors. Impulsive subjects score above their reference group median on errors and below the median on latency. The converse of this defines reflective individuals. However, studies to date have failed to consider that percentage of subjects in every sample scoring above and below the median on both MFF response time and errors. Data gathered in this investigation provided an opportunity to study that previously "undefinable third".

All subjects in Sample One were coded for analysis into groups 1, 2, 3, and 4. Group 2 identified impulsives, group 3, reflectives. Subjects categorized as group 1 scored below the sample median for their sex on both MFF errors and response time. Such individuals were accurate as well as fast. Group 4 boys and girls scored above their sample median on time and error; these individuals had long decision times but also made many errors.

It occurred to Kagan (1966b) that children who are both accurate and fast on tasks similar to but easier than the MFF might be especially bright persons. He concluded, however, that fast response time on the MFF would inevitably be associated with a high error score due to the difficulty of the task. Although Kagan stated that a second small group of subjects (group 4) do not reflect upon alternatives during delay because of fear of being

incorrect, he had earlier noted a high relationship ( r = .91 and .92) between head - eye fixations of the MFF standard stimulus and mean response time. This relationship was felt to demonstrate that subjects "with long response latencies are actively considering alternative answers during the delay period" (Kagan, 1965b, p. 625). It seemed during the course of this investigation in testing over six hundred children, that the excessively fearful child was a rarity. It was felt that children actively considering possibilities over extended periods of time whose eventual response was incorrect were perhaps duller individuals. A one-way analysis of variance was carried out to test this non-hypothesized consideration.

The findings depicted in Tables 8 and 9 were rather unexpected since prior studies reported no significant differences in verbal intelligence between reflective and impulsive school-age groups. Analysis of variance showed differences to exist amongst the four groups for both males and females ($p < .01$) and the Newman-Keuls procedure was used to test differences between group means (Winer, 1962, p. 102). The results indicate that group 1 subjects (i.e. those fast and accurate) are relatively bright since their mean IQ scores are higher than mean IQ scores for both impulsive (group 2) and slow but incorrect (group 4) subjects. The connotation "dull" cannot be meted out to group 4 children since their average scores were at a respectable mid-range classification somewhat above the mean scores of the impulsive children but not significantly different from the higher scores of groups 1 and 3. Significant differences were obtained between groups 1 and 2 and 3 and 2 for female

TABLE 8

SAMPLE ONE (FEMALES)

SUMMARY OF ANALYSIS OF VARIANCE FOR IQ SCORES

| Source | Sum Squares | MS | df | F | P |
|---|---|---|---|---|---|
| Groups | 2891.000 | 963.67 | 3 | 5.22 | 0.001 |
| Error | 45034.000 | 184.57 | 244 | | |

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR IQ SCORES

| Groups | | 3 | 1 | 4 | 2 |
|---|---|---|---|---|---|
| | Means | 112.568 | 112.406 | 107.540 | 104.965 |
| 2 | 104.965 | 7.603* | 7.442* | 2.575 | 0.0 |
| 4 | 107.540 | 5.028 | 4.866 | 0.0 | |
| 1 | 112.406 | 0.162 | 0.0 | | |
| 3 | 112.568 | 0.0 | | | |

* $p < .05$

TABLE 9

SAMPLE ONE (MALES)

SUMMARY OF ANALYSIS OF VARIANCE FOR IQ SCORES

| Source | Sum Squares | MS | df | F | P |
|---|---|---|---|---|---|
| Groups | 2340.000 | 780.00 | 3 | 4.06 | 0.007 |
| Error | 46641.000 | 191.94 | 243 | | |

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR IQ SCORES

| Groups | | 1 | 3 | 4 | 2 |
|---|---|---|---|---|---|
| | Means | 111.852 | 111.384 | 107.744 | 104.714 |
| 2 | 104.714 | 7.138 | 6.669* | 3.030 | 0.0 |
| 4 | 107.744 | 4.108 | 3.640 | 0.0 | |
| 3 | 111.384 | 0.468 | 0.0 | | |
| 1 | 111.852 | 0.0 | | | |

* $p < .05$

subjects and between 3 and 2 for male subjects.

No significant differences were found between male and female subjects by category across grade levels. Indeed, mean IQ scores for males and females in groups 2 and 4 were almost identical. The trend for both sexes was also quite similar with intelligence quotient scores for boys and girls being lowest for impulsives (group 2), and highest for reflectives (group 3) and those fast and correct (group 1). Group 4 scores were in the intermediate range.

The non-hypothesized IQ differences led to a further analysis of the data. It had previously been shown that impulsive subjects performed significantly more poorly on a mathematics achievement test than reflective subjects (see page 40). Analysis of covariance with math scores as the dependent variable and IQ scores as the covariate were computed separately for males and females. Although the trend was still evident, statistically significant differences occured only at grades one and four for the boys and grade three for the girls. At all six grade levels impulsive girls did less well than reflective girls; impulsive males scored lower on the mathematics test at five of six grade levels.

Sex differences

Results of hypothesis 3 revealed a greater relationship between errors and latency on the MFF for boys than for girls. A reversal of this situation was found between MFF errors and IQ with a stronger relationship favoring female subjects. However, as significant differences were not obtained in testing

TABLE 10

SAMPLE ONE (MALES )

SUMMARY OF ANALYSIS OF COVARIANCE FOR MATHEMATICS AND IQ SCORES

| Grade | Source | MS | df | Adjusted F | P | Adjusted means |
|---|---|---|---|---|---|---|
| 1 | Group | 1891.3906 | 1 | 8.6600 | 0.006 | |
| | Within group | 218.4034 | 38 | | | |
| | Impulsive | | | | | 41.4820 |
| | Reflective | | | | | 55.6576 |
| 2 | Group | 416.7304 | 1 | 1.5976 | 0.220 | |
| | Within group | 260.8405 | 21 | | | |
| | Impulsive | | | | | 40.7718 |
| | Reflective | | | | | 49.1313 |
| 3 | Group | 95.1557 | 1 | 1.4943 | 0.233 | |
| | Within group | 63.6755 | 25 | | | |
| | Impulsive | | | | | 46.0855 |
| | Reflective | | | | | 50.0042 |
| 4 | Group | 286.3505 | 1 | 7.3715 | 0.013 | |
| | Within group | 38.8451 | 21 | | | |
| | Impulsive | | | | | 48.4661 |
| | Reflective | | | | | 55.5711 |
| 5 | Group | 52.6564 | 1 | .7161 | 0.405 | |
| | Within group | 73.5278 | 25 | | | |
| | Impulsive | | | | | 50.7357 |
| | Reflective | | | | | 47.9321 |
| 6 | Group | 24.0180 | 1 | .2456 | 0.624 | |
| | Within group | 97.7785 | 29 | | | |
| | Impulsive | | | | | 46.7101 |
| | Reflective | | | | | 48.5165 |

TABLE 11

SAMPLE ONE (FEMALES)

SUMMARY OF ANALYSIS OF COVARIANCE FOR MATHEMATICS AND IQ SCORES

| Grade | Source | MS | df | Adjusted F | P | Adjusted means |
|---|---|---|---|---|---|---|
| 1 | Group | 260.3801 | 1 | 2.0683 | 0.162 | |
| | Within group | 125.8868 | 27 | | | |
| | Impulsive | | | | | 43.3150 |
| | Reflective | | | | | 51.3260 |
| 2 | Group | 214.2673 | 1 | 2.4697 | 0.132 | |
| | Within group | 86.7565 | 20 | | | |
| | Impulsive | | | | | 46.3074 |
| | Reflective | | | | | 52.5007 |
| 3 | Group | 280.2631 | 1 | 5.9441 | 0.022 | |
| | Within group | 47.1495 | 27 | | | |
| | Impulsive | | | | | 48.1202 |
| | Reflective | | | | | 54.9381 |
| 4 | Group | 219.5615 | 1 | 3.0031 | 0.097 | |
| | Within group | 73.1110 | 22 | | | |
| | Impulsive | | | | | 48.4505 |
| | Reflective | | | | | 54.6782 |
| 5 | Group | 100.0856 | 1 | 2.6868 | 0.113 | |
| | Within group | 37.2502 | 27 | | | |
| | Impulsive | | | | | 49.6811 |
| | Reflective | | | | | 53.5306 |
| 6 | Group | 1.5422 | 1 | .0242 | 0.877 | |
| | Within group | 63.5539 | 25 | | | |
| | Impulsive | | | | | 51.9958 |
| | Reflective | | | | | 52.4768 |

hypothesis 3, it was felt that a more detailed analysis of age-grade MFF scores might ascertain whether a separation of the data by sex was warranted.

A two-way analysis of variance was carried out to discover if significant differences existed between the sexes on MFF response time and error scores. As can be seen in Table 12, the overall differences between males and females for both latency and for errors were not significant. Grade differences were found for both time and error scores ( $p < .01$). Girls exhibited the greatest delay in decision-making in grades two, three, and four, with the response time differential being greatest between the first and second grades. Boys in Sample One, from grades two to six inclusive, made consistently more errors than their female counterparts.

When an analysis of variance was calculated using pure groups (i.e. impulsive and reflectives only) the same strong trend prevailed attesting to the existence of sex differences across age categories (see tables C and D Appendix A).

The most consistent and highly significant finding for boys and girls was a grade difference for both MFF response time and errors. The decision-time variable showed a marked increase from grades one to two for all groupings, (i.e. impulsive, reflective, and total sample). Males of all groupings combined were least reflective, in terms of response time alone, in grades six, five, and one, and most reflective in grade two. Females in this group were also most

TABLE 12

SAMPLE ONE

SUMMARY OF ANALYSIS OF VARIANCE FOR SEX DIFFERENCES ON MFF VARIABLES: TOTAL GROUP

| Source | Sum Squares | MS | df | F | P |
|---|---|---|---|---|---|
| Variable 1: Latency | | | | | |
| A Sex | 2094450.00 | 2094450.00 | 1 | 3.2289 | 0.0730 |
| B Grade | 20558200.00 | 4111650.00 | 5 | 6.3388 | 0.0000 |
| Error | 316539000.00 | 648645.00 | 488 | | |
| Variable 2: Error | | | | | |
| A Sex | 96.60 | 96.60 | 1 | 2.6512 | 0.1041 |
| B Grade | 2706.82 | 541.36 | 5 | 14.8574 | 0.0000 |
| Error | 17781.40 | 36.43 | 488 | | |

reflective in grade two and displayed shortest decision times in grades one, six and five. The trend for pure groups was very similar. A cross-section of impulsive male and female subjects showed grade one children to be the most impulsive followed closely by grades five and six; the intermediate grades, two, three, and four, were the most reflective grade levels of an overall impulsive grouping. Among reflectives of both sexes, grade six subjects evidenced the shortest response time.

For all groupings, the greatest number of errors on the MFF was committed in grade one and the fewest in grade six. This held for both sexes and is in accordance with findings reported earlier (see page 41).

It is of interest to note the extreme difference in mean time and error scores between impulsive and reflective subjects at every age-grade level. Such a difference confirms the power of the MFF in selecting impulsive and reflective children of various ages.

# CHAPTER V

## SUMMARY, CONCLUSIONS, AND IMPLICATIONS

The primary purpose of this study was to extend and clarify research stimulated through the pioneering work of Jerome Kagan and his colleagues. Kagan's development of the Matching Familiar Figures test, a unique non-verbal measure of decision time, has enabled the identification of two rather basic cognitive styles, reflective and impulsive. The reflective child actively considers response possibilities and consequently commits few errors; the impulsive child neglects to evaluate alternatives carefully and in the haste of decision-making makes many errors. Kagan's (1966b) research has shown that an individual's preferred mode of responding "generalizes across varied problem situations, and shows remarkable intraindividual stability" (p.490).

A secondary objective of this study was to explore an hypothesized antecedent of reflection-impulsivity in the form of mother-child interaction as evidenced by the relationship between mother's conceptual systems and children's cognitive style.

Hypothesis 1 based on Kagan's (1966b) investigations which suggested that children become more reflective as they grow older, was not confirmed. This hypothesis was tested using pure groups of reflective and impulsive children (i.e. categorized on the basis of both time and error scores). However, when decision time and recognition errors on the MFF are

analysed separately, some findings with interesting implications emerge. To the extent that data from a cross-sectional study can be considered representative of a developmental trend in cognitive style, there is a definite tendency for boys and girls to make consistently fewer recognition errors as they become older. However, no such trend is apparent for response time, an interesting finding in itself since numerous studies (for example, Schwebel 1966; Ward, 1968) have presumed latency alone to be a sufficient index for Kagan's concept of reflection-impulsivity. Thus, regardless of the criteria for reflectivity, findings based on Sample One of this study clearly contradict the notion that tendency for delay in situations of response uncertainty increases with chronological age. While the greater difficulty of the MFF test for younger age groups appears to be reflected in error scores, response time seems to bear no such direct relationship to task difficulty.

The findings of this study indicate that reflective-impulsive cognitive styles in elementary school children tend to progress from impulsivity to reflectivity to impulsivity. However, it is conceivable that a child would maintain his position relative to his peers with external conditions, associated with age or grade-level, exerting an influence toward reflection or impulsivity. It remains for a detailed longitudinal study to ascertain whether a child's reflective or impulsive orientation remains invariant throughout the school years.

The results obtained in testing hypothesis 2 suggest that impulsively oriented individuals may well be at a disadvantage in performance on some measures of scholastic achievement. A lack of consistent findings in the literature with respect to the effect of reflection-impulsivity on academic performance could be due to variations in the format of measuring instruments. Indeed, it is possible that differences in achievement scores of impulsive and reflective children are not related as much to learning impediments associated with cognitive style as they are to the effect of response uncertainty situations employed in test design. This is particularly the case when examination formats maximize response uncertainty and the impulsive child fails to give careful consideration to alternatives. The data are persuasive in inviting researchers to explore learning versus performance situations where cognitive styles emphasizing "haste" and "caution" are likely to have differential effects.

Non-hypothesized results showed that impulsive subjects had the lowest mean IQ scores among a total of four categories of individuals as determined by MFF decision time and error count. Such a finding was surprising since Kagan's studies (Kagan, et al., 1964a, 1965b) report relative independence between verbal ability, as assessed by WISC sub-tests, and response time. The reflection - impulsivity dimension is presumed to be orthogonal to the generally accepted notion of intelligence. While Cathcart and Liedtke (1969) noted a tendency for the more intelligent

group of subjects to be reflective, only one study reported significant IQ differences between reflective and impulsive groups. Meichenbaum and Goodman (1969) found that reflective kindergarten children scored significantly higher than impulsive children ($p < .05$) on all subtests of the Thurstone Primary Mental Abilities test (PMA) for grades K-1. The investigators, however, are quick to caution against attributing the differences found between impulsive and reflective children to intelligence. It is suggested that the formats of the PMA and Kagan's MFF are similar; nevertheless, the same argument can be applied to the Lorge-Thorndike Tests used in this study to provide a measure of intelligence. It is probable that conceptual tempo accounts for some of the differences in intelligence scores between impulsive and reflective subjects. The extent to which IQ results are contaminated by differences in cognitive styles can be determined only by further research. The weight of the evidence supported by this study and other investigations (Kagan, 1965, Meichenbaum and Goodman, 1969) strongly suggests that future studies of academic performance consider employing response time as a major independent variable.

One of Kagan's most striking findings (Kagan et al., 1964, Kagan, 1965) thus far overlooked by researchers, is that reflective and impulsive children differ not in ability to recognize or verbally describe essential visual components of tachistoscopically presented scenes, but only in completeness of their graphic reproduction. One implication is that it

would seem untenable to assume an isomorphic relationship between a child's understanding of a concept and a score obtained on a measuring instrument purported to reflect such understanding. Further, these data seriously question the use of children's drawings as an index of mental ability. Many investigations (for example, Harris, 1963; Sundberg and Ballinger, 1968) have proceeded on the assumption that a child's drawings of human figures parallel his cognitive growth. While a child's conception of a frequently experienced object, such as a human figure, may be representative of the increased complexity of his concepts in general, it may not be reliably assessed because of the interfering effects of an impulsive cognitive style. Kagan et al., (1964) found that when asked to draw a human face, reflective children drew more parts of the face than impulsive children. A study exploring the relationship between MA indices based on the Goodenough-Harris Drawing Test and reflection-impulsivity would be a research venture of considerable importance.

This study fails to reveal any sharp distinctions in reflection-impulsivity between males and females. What emerges in a rather consistent fashion is that conceptual tempo is not as great a contributing factor in relation to the commission of perceptual recognition errors for girls as for boys. Although correlations with latency and IQ and latency and errors are similar for both sexes, the relationship between IQ and errors is repeatedly greater for females than for males. At five of six grade levels, mean and

median response times were longer for females than for males. A similar situation prevailed with MFF errors; at only the grade one level did females make more errors than males. Thus, on both indices of conceptual tempo, response time and errors, boys were more impulsive than girls. Harris (1963) noted a tendency for girls to score higher on the Goodenough-Harris "draw-a-man" 73-point scale than boys. Such a finding is consonant with the concern expressed here regarding the possible interfering effect of impulsivity on detail and accuracy in children's drawings.

Overall, sex differences in reflection-impulsivity are, as Kagan et al., (1963) discovered in their early investigations, "not easy to explain" (p. 111). However, similarity in the direction and pattern of relationships of MFF scores to other variables for both sexes should not be sufficient cause for researchers of cognition and personality to pool data in future studies. Both Kagan et al., (1966 p.111) and Maccoby (1966, p. 46) recognize that the sexes differ with respect to overt, behavioral acts of impulsivity and that similar conceptual responses may be the result of different causal agents in boys and girls. It was the search for just such antecedents of cognitive style in males and females that led to an analysis of parent-child interactions from a Conceptual Systems point of view.

In conclusion, comparative studies of the sexes along a number of dimensions need be undertaken if the relative contribution of factors

affecting differences in personality and cognitive traits for boys and girls is to be uncovered.

In this investigation the relationship between social-class and reflection-impulsivity proved to be definitive. These data showed that a significant over-representation of impulsive boys and girls came from the lower socioeconomic sector of the sample population. The results lend support to Kagan's (1967) theorizing and concur with the observations of Schwebel (1966) and Campbell (1968).

One hypothesis advanced by Kagan et al., (1964) is that anxiety resulting from repeated failures, as a consequence of impulsive responding, could lead to a generalized expectation of failure and withdrawal from intellectual tasks. The impulsive child could then be viewed as a potential nonachiever; by contrast, the reflective child appears to be endowed with all the characteristics of a high achiever (Kagan et al., 1964; Kagan, 1966b). If these behavioral correlates attributed to reflective and impulsive children prove to be accurate then the significant relationships reported in this study between conceptual tempo and social class take on considerable importance. Reflective children found predominantly in the higher socioeconomic classes would manifest high task involvement, persistence, and concern for intellectual mastery. Lending support to this consideration, despite a failure to control for social class, is Davids' (1968) discovery that bright high-school underachievers differed from their achieving counterparts of similar IQ in response time to identification of a series of ambiguous

pictures. The achievers delayed longer before responding but arrived at correct solutions earlier than the nonachievers.

Since Kagan (1968) provides evidence that class differences in some basic aspects of intellectual functioning are evident by eight and thirteen months of age, hope for behavioral modification of response style in children would seem to reside with the mother. One implication of immediate benefit to those interested in closing the educational gap that exists between social classes would seem to be the provision of early training in reflection to mothers of children from lower-socioeconomic classes.

Sample Two provided the investigator with an opportunity for a separate study based on theoretical links between Conceptual Systems theory and reflection-impulsivity.

Much research in socialization, such as that of Hess (1964) and Hess and Shipman (1965a, 1965b) is predicated upon the point of view that the mother is the single most important training agent in the life of the child. However, this is not to suggest a simple cause - effect model of parent influencing child (the assumption of which has been challenged by Bell (1968)), nor to deny the importance of family interaction (see Handel, 1965) but merely recognition that the structural characteristics of the mother's conceptual system are instrumental in determining the learning environment of the child. The Conceptual Systems orientation used in this

study specifically refers to a particular cognitive theory derived largely from the writings of Harvey, Hunt and Schroder (1961) and Schroder, Streufert and Driver (1967). Such theory and supporting research provided indications of a relationship between maternal conceptual systems and children's cognitive style (Sieber and Lanzetta, 1966; Hess and Shipman, 1965a, 1965b). However, the reflection-impulsivity cognitive style of grade one children was found to be unrelated to the concrete-abstract dimension of their mother's conceptual framework.

Investigators should not be too quick to dismiss the possibility of a relationship between concrete cognitive structures and impulsive responding on the basis of the results reported in this study. Indeed, there is still considerable evidence to suggest that an important antecedent to the development of more abstract conceptual structures may involve not only the "education of a child's attention" in the Gibson sense of active exploration of the environment but also encouragement of alternative ways of perceiving stimuli. The generation and consideration of alternatives would likely be reflected in the speed with which decisions are reached. This would be consistent with Kagan's earlier findings (Kagan, 1965a, 1965a, 1966b). Failure to find a significant relationship in testing hypothesis 5 could well be due to the instrument used to measure abstractness of conceptual structure. In addition, the norms for Tuckman's (1966a, 1966b) Interpersonal Topical Inventory based on college freshmen may be totally inappropriate for the mothers in Sample Two. The reading level

of the ITI is not excessively difficult as the investigator found it suitable for grade-eight level adults attending an adult retraining program. Also, the writer is unaware of any adequate studies of reliability for the ITI nor have any conclusive results attesting to construct validity been reported in the literature. A replication of the Sample Two study using more concrete behavioral measures, such as communication modes of mothers, would seem warranted.

In the main, this study has served to clarify a number of conclusions derived from studies of reflection-impulsivity; while many of Kagan's research and theoretical assumptions were confirmed, some observations received only partial support. Results of much prior research in this area had been rather tenuously accepted due to a variety of methodological considerations, the most notable of which were: inconsistency of results, restricted sample size, and variations in measures of response uncertainty and intelligence. However, the relatively large sample used in this investigation at each of six elementary grade-levels did provide some insight into developmental trends of cognitive style. Social class differences in conceptual tempo and the relationship between standardized intelligence measures and reflection-impulsivity deserve further investigation. The attempt to link Kagan's reflection-impulsivity dimension to a larger mainstream of psychological theory proved unsuccessful and problems of measurement are seen as obstacles to this endeavour.

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# APPENDICES

# APPENDIX A TABLES

APPENDIX A

TABLE A

MFF MEDIAN TIME, TOTAL ERRORS,AND GROUPINGS FOR SAMPLE ONE

| | Grade | Impulsive | Reflective | Mixed | Total | Latency | Errors |
|---|---|---|---|---|---|---|---|
| Males | 1 | 21 | 20 | 14 | 55 | 92.0 | 17 |
| | 2 | 12 | 12 | 16 | 40 | 104.5 | 15 |
| | 3 | 14 | 14 | 10 | 38 | 102.5 | 13 |
| | 4 | 12 | 12 | 14 | 35 | 91.5 | 12 |
| | 5 | 16 | 12 | 12 | 40 | 82.5 | 11 |
| | 6 | 16 | 16 | 8 | 40 | 83.5 | 10 |
| Total | | 91 | 86 | 70 | 247 | - | - |
| Females | 1 | 14 | 16 | 18 | 48 | 79.5 | 18 |
| | 2 | 12 | 11 | 13 | 36 | 107.0 | 12 |
| | 3 | 16 | 14 | 10 | 40 | 122.5 | 9 |
| | 4 | 14 | 11 | 13 | 38 | 117.0 | 9 |
| | 5 | 15 | 15 | 16 | 46 | 90.5 | 11 |
| | 6 | 14 | 14 | 13 | 41 | 88.0 | 8 |
| Total | | 92 | 83 | 82 | 248 | - | - |

APPENDIX A

TABLE B

MEANS OF MAJOR VARIABLES FOR SAMPLE ONE MALES AND FEMALES BY GRADE

| | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| Grade | Age | Latency | Error | IQ | Age | Latency | Error | IQ |
| 1 | 82.25 | 102.50 | 16.56 | 105.92 | 81.78 | 94.06 | 17.34 | 103.55 |
| 2 | 94.76 | 146.60 | 14.43 | 108.53 | 93.61 | 151.16 | 13.05 | 110.08 |
| 3 | 106.00 | 117.97 | 13.71 | 107.73 | 104.54 | 147.86 | 10.79 | 107.39 |
| 4 | 117.94 | 103.35 | 12.37 | 111.88 | 117.57 | 140.27 | 10.13 | 111.21 |
| 5 | 131.92 | 92.82 | 12.32 | 107.42 | 129.28 | 105.09 | 11.56 | 111.89 |
| 6 | 142.34 | 87.44 | 10.70 | 109.07 | 144.04 | 95.00 | 9.24 | 110.12 |

# APPENDIX A

## TABLE C

## SAMPLE ONE

### SUMMARY OF ANALYSIS OF VARIANCE FOR SEX DIFFERENCES ON MFF VARIABLES: IMPULSIVES

| | | | | | |
|---|---|---|---|---|---|
| Variable 1: Latency | | | | | |
| A Sex | 26432.00 | 26432.00 | 1 | 0.8387 | 0.3610 |
| B Grade | 973562.00 | 194712.00 | 5 | 6.1784 | 0.0000 |
| Error | 5325950.00 | 31514.50 | 169 | | |
| Variable 2: Error | | | | | |
| A Sex | 68.07 | 68.07 | 1 | 3.3408 | 0.0693 |
| B Grade | 1206.77 | 241.35 | 5 | 11.8445 | 0.0000 |
| Error | 3443.68 | 20.37 | 169 | | |

## TABLE D

## SAMPLE ONE

### SUMMARY OF ANALYSIS OF VARIANCE FOR SEX DIFFERENCES ON MFF VARIABLES: REFLECTIVES

| Source | | | | | |
|---|---|---|---|---|---|
| Variable 1: Latency | | | | | |
| A Sex | 1824260.00 | 1824260.00 | 1 | 2.4331 | 0.1208 |
| B Grade | 18718700.00 | 3743740.00 | 5 | 4.9933 | 0.0002 |
| A - B Interaction | 8848130.00 | 1769630.00 | 5 | 2.3602 | 0.0426 |
| Error | 1162212000.00 | 749753.00 | 155 | | |
| Variable 2: Errors | | | | | |
| A Sex | 59.78 | 59.78 | 1 | 7.0752 | 0.0086 |
| B Grade | 463.57 | 92.71 | 5 | 10.9716 | 0.0000 |
| A - B Interaction | 99.41 | 19.88 | 5 | 2.3527 | 0.0431 |
| Error | 1309.82 | 8.45 | 155 | | |

# APPENDIX B MEASURES

Matching Familiar Figures Test
(Sample of one task. Standard stimulus and variants on single page for illustrative purposes only.)

Directions for Matching Familiar Figures

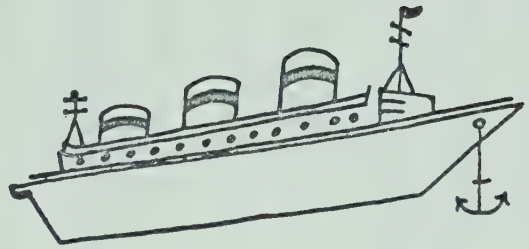
Interpersonal Topical Inventory

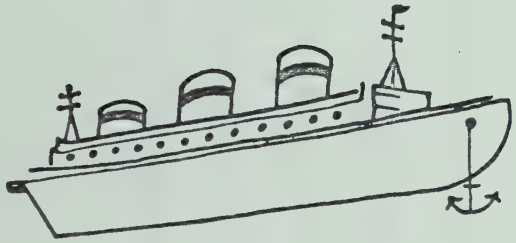
ITI Scoring Key

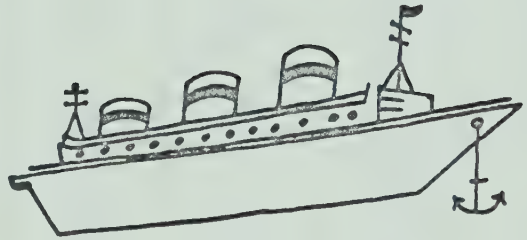
Classification Norms for the ITI

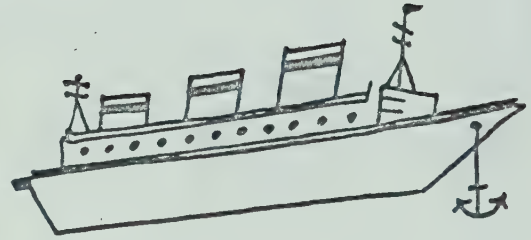
APPENDIX B

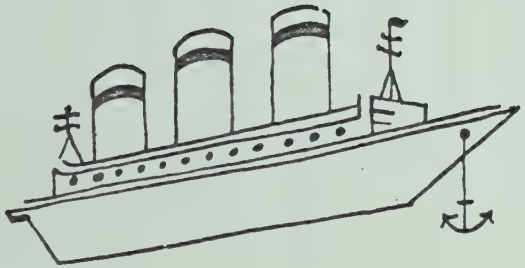
MATCHING FAMILIAR FIGURES

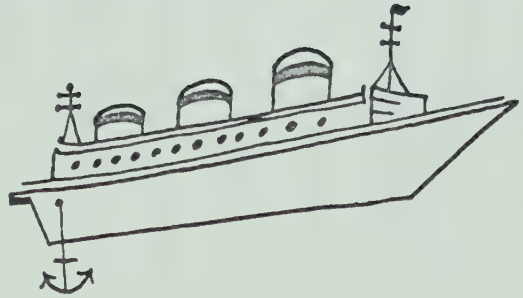


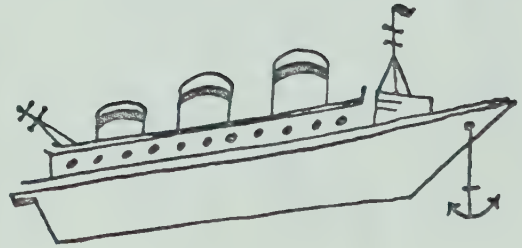












# APPENDIX B

## DIRECTIONS FOR MATCHING FAMILIAR FIGURES

"I am going to show you a picture of something you know and then some pictures that look like it. You will have to point to the picture on this bottom page (point) that is just like the one on this top page (point). Let's do some for practice." Examiner shows picture items and helps the child to find the correct answer. "Now we are going to do some that are a little bit harder. You will see a picture on top and six pictures on the bottom. Find the one that is just like the one on top and point to it."

Examiner will record latency to first response to the half-second and total number of errors for each item. If Subject is correct, Examiner will praise. If wrong, Examiner will say, "No, that is not the right one. Find the one that is just like this one (point)." Continue to code responses (not times) until child makes a maximum of six errors or gets the item correct. If incorrect, Examiner will show the right answer.

The Matching Familiar Figures test provides two sets of practice cards. Once the test proper has begun the examiner does not show the subject the correct answer but merely proceeds to the next task once a maximum of six errors has been attained. The two pages of the test booklet are placed at right angles to one another so that both the simulus and the alternatives are clearly visible to the subject at the same time.

# APPENDIX B

## INTERPERSONAL - TOPICAL INVENTORY

### INSTRUCTIONS:

You will be given some situations and topics to which we would like you to respond. The responses are given in pairs. You are to choose one response from each pair. Choose the response that most closely fits your opinion or feeling and indicate your choice by circling the letter "A" or "B" corresponding to the response chosen. Always choose one member of each pair. Never choose both members of the pair and do not skip over any of the pairs. If you agree with both, choose the one you agree with most strongly. If you do not agree with either, choose the one you find the least disagreeable of the two.

### EXAMPLE:

Here is an example of the way the questions will be asked and the way they should be answered. The manner in which you will indicate your choice between the two given responses is illustrated below:

When I am confused . . .

Pair No.

(i)

| (A) | B |
|---|---|
| I try to find a solution and end the confusion | I completely ignore the fact I am confused. |

(ii)

| A | (B) |
|---|---|
| I break out into a nervous sweat. | I remain calm at all times. |

### HOW TO RESPOND:

First: Decide which response you agree with most.

Second: Indicate which response you agree with most by circling the identifying letter. Thus, if in comparing the first pair of statements, you agree with the statement, "I try to find a solution and end the confusion," more than with the statement, "I completely ignore the fact that I am confused," you would circle the letter "A" (above the chosen statement). Having chosen one (never both, never neither) statement from the first pair of statements, you

would then move on the second pair. If, in considering the second pair, you find that you agree more with the statement, "I remain calm at all times," (as compared to the statement, "I break out into a nervous sweat"), you would circle the letter "B".

On the pages that follow there are 36 different pairs of responses. There are six pairs to one page. You are to select one response from each pair, the one that more accurately shows your opinion of feeling and record your choice by circling the letter indicating the statement chosen. Be frank and indicate, in each case, your true feeling or opinion or the reaction which you actually would make in the situation. Do not indicate how you should feel or act; rather, indicate how you do feel and act.

Make sure that you are aware of the situation or topic that each pair of responses refers to. You will find the situation or topic indentified at the top of each page. All items on the page refer to the situation or topic appearing at the top of that page.

When you are finished, your paper should contain 36 circles. Check back and make sure that you have made 36 circles, no more no less.

REMEMBER: (1) Respond only once for each pair; that is, choose one member of the pair, never both, never neither. Indicate your choice by circling either "A" or "B".

(2) When you are finished you should have made 36 circles.

Work at your own rate of speed but work straight through the inventory without stopping. Once you have completed a page do not return to it.

YOU MAY BEGIN

1. Imagine that someone has criticized you. Choose the response from each pair that comes closest to your feelings about such criticism. Indicate your choice by circling either "A" or "B".

When I am criticized ...

| Pair No. | |
|---|---|
| (1) | |
| A. I try to take the criticism, think about it, and value it for what it is worth. Unjustified criticism is as helpful as justified criticism in discovering what other people's standards are | B. I try to accept the criticism but often find that is is not justified. People are too quick to criticize something because it doesn't fit their standards. |
| (2) | |
| A. I try to determine whether I was right or wrong. I examine my behavior to see if it was abnormal. Criticism usually indicates that I have acted badly and tends to make me aware of my own bad points. | B. It could possibly be that there is something misunderstanding about something I did or said. After we both explain our viewpoints, we can probably reach some sort of compromise. |
| (3) | |
| A. I listen to what the person says and try to accept it. At any rate, I will compare it to my own way of thinking and try to understand what it means. | B. I feel that either I'm not right, or the person who is criticizing me is not right. I have a talk with the person to see what's right or wrong. |
| (4) | |
| A. I usually do not take it with good humor. Although, at times, constructive criticism is very good, I don't always think that the criticizer knows what he is talking about. | B. At first I feel that it is unfair and that I know what I am doing, but later I realize that the person criticizing me was right and I am thankful for his advice. I realize that he is just trying to better my actions. |
| (5) | |
| A. I try to ask myself what advantages this viewpoint has over mine. Sometimes both views have their advantages and it is better to combine them. Criticism usually helps me to learn better ways of dealing with others. | B. I am very thankful. Often I can't see my own errors because I am too engrossed in my own work at the time. An outsider can judge and help me correct the errors. Criticism in everyday life usually hurts my feelings, but I know it is for my own good. |
| (6) | |
| A. It often has little or no effect on me. I don't mind constructive criticism too much, but I dislike destructive criticism. Destructive criticism should be ignored. | B. I try to accept and consider the criticism. Sometimes it has caused me to change myself; at other times I have felt that the criticism didn't really make much sense. |

TURN THE PAGE OVER

2. Imagine that you are in doubt. Choose the response from each pair that comes closest to your feelings about each doubt. Indicate your choice by circling either "A" or "B".

When I am in doubt ...

| Pair No. | |
|---|---|
| (7) | |
| A. I become uncomfortable. Doubt can cause confusion and make one do a poor job. When one is in doubt he should ask and be sure of himself. | B. I find myself wanting to remove the doubt, but this often takes time. I may ask for help or advice if I feel that my questions won't bother the other person. |
| (8) | |
| A. I don't get too upset about it. I don't like to ask someone else unless I have to. It's better to discover the correct answer on your own. | B. I usually go to someone who knows the correct answer to my question. Sometimes I go to a book which will set me straight by removing the doubt. |
| (9) | |
| A. I first try to reason things out and check over the facts. Often I approach others to get ideas that will provide a solution. | B. I think things over, ask questions, and see that I can come up with. Often several answers are reasonable and it may be difficult to settle on one. |
| (10) | |
| A. I realize that I'll have to decide on the correct answer on my own. Others try to be helpful, but often do not give me the right advice. I like to judge for myself. | B. I usually try to find out what others think, especially my friends. They may not know the answer, but they often give me some good ideas. |
| (11) | |
| A. I look over the problem and try to see why there is a doubt. I try to figure things out. Sometimes I just have to wait awhile for an answer to come to me. | B. I try to get some definite information as soon as possible. Doubt can be bad if it lasts too long. It's better to be sure of yourself. |
| (12) | |
| A. I consider what is best in the given situation. Although one should not rush himself when in doubt, he should certainly try to discover the right answer. | B. I act according to the situation. Sometimes doubt can be more serious than at other times and many of our serious doubts must go unanswered. |

TURN THE PAGE OVER

3. Imagine that a friend has acted differently toward you. Choose the response from each pair that comes closest to your feelings about such an action. Indicate your choice by circling either "A" or "B".

When a friend acts differently toward me...

| Pair No. | |
|---|---|
| (13) | |
| A. I am not terribly surprised because people can act in many different ways. We are different people and I can't expect to understand all his reasons for acting in different ways. | B. I am usually somewhat surprised but it doesn't bother me very much. I usually act the way I feel towards others. People worry too much about others' actions and reactions. |
| (14) | |
| A. I find out why. If I have done something wrong I will try to straighten out the situation. If I think he's wrong, I expect him to clear things up. | B. I feel that I may have caused him to act in a different way. Of course, he may have other reasons for acting differently which would come out in time. |
| (15) | |
| A. I first wonder what the trouble is. I try to look at it from his viewpoint and see if I might be doing something to make him act differently toward me. | B. It is probably because he has had a bad day, which would explain this different behavior; in other cases he may just be a changeable kind of person. |
| (16) | |
| A. It is probably just because something is bothering him. I might try to cheer him up or to help him out. If these things didn't work I would just wait for him to get over it. | B. I try to understand what his different actions mean. I can learn more about my friend if I try to figure out why he does things. Sometimes the reasons may not be very clear. |
| (17) | |
| A. There has to be a definite reason. I try to find out this reason, and then act accordingly. If I'm right I'll let him know. If he's wrong, he should apologize. | B. I usually let him go his way and I go mine. If a friend wants to act differently that's his business, but it's my business if I don't want to be around when he's that way. |
| (18) | |
| A. I don't get excited. People change and this may cause differences. It is important to have friends, but you can't expect them to always be the same. | B. I like to get things back to normal as soon as possible. It isn't right for friends to have differences between them. Whoever is at fault should straighten himself out. |

TURN THE PAGE OVER

4. Think about the topic of people in general. Choose the response from each pair that comes closest to your thoughts about people. Indicate your choice by circling either "A" or "B".

This I believe about people ...

| Pair No. | | |
|---|---|---|
| (19) | A. Whatever differences may exist between persons, they can usually get along if they really want to. Although their ideas may not agree, they probably still have something in common. | B. People can learn from those who have different ideas. Other people usually have some information or have had some experience which is interesting and can aid to one's knowledge. |
| (20) | A. People can act in all sorts of ways. No single way is always best, although at certain times a particular action might be wiser than others. | B. Each person should be able to decide the correct thing for himself. There are always a few choices to be made and the individual himself is in the best position to pick the right one. |
| (21) | A. Some people think they know what's best for others and try to give advice. These people should not make suggestions unless asked for help. | B. There are certain definitive ways in which people should act. Some don't know what the standards are and therefore need to be straightened out. |
| (22) | A. I can tell if I am going to get along with a person very soon after meeting him. Most people act either one way or another and usually it is not difficult to say what they are like. | B. It's hard for me to say what a person is like until I've known him a long time. People are not easy to understand and often act in unpredictable ways. |
| (23) | A. People have an outside appearance that usually isn't anything like what can be found on the inside, if you search long and hard enough. | B. Each person is an individual. Although some people have more good or bad points than others, no one has the right to change them. |
| (24) | A. People can be put into categories on the basis of what they're really like. Knowing the way a person really is helps you to get along with him better. | B. People are unlike one another in many respects. You can get along with people better and better understand them if you are aware of the differences. |

TURN THE PAGE OVER

5. Think about the general topic of leaders. Choose the response from each pair that comes closest to your thoughts about leaders. Indicate your choice by circling either "A" or "B".

Leaders ...

| Pair No. | |
|---|---|
| (25) | |
| A. Leaders do not always make the right decisions. In such cases, it is wise for a man to look out for his own welfare. | B. Leaders are necessary in all cases. If a leader cannot make the right decisions another should be found who can. |
| (26) | |
| A. Leaders cannot provide all the answers. They are like other people - they have to try to figure out what action is necessary and learn from their mistakes. | B. Leaders make decisions sometimes without being sure of themselves. We should try to understand this and think of ways to help them out. |
| (27) | |
| A. I like a leader who is aware of how the group feels about things. Such a leader would not lead any two groups in exactly the same way. | B. A person should be able to put his confidence in a leader and feel that the leader can make the right decision in a difficult situation. |
| (28) | |
| A. There are times when a leader should not make decisions for those under him. The leader has the power to decide things, but each man has certain rights also. | B. A leader should give those under him some opportunity to make decisions, when possible. At times, the leader is not the best judge of a situation and should be willing to accept what others have to say. |
| (29) | |
| A. Some leaders are good, others are quite poor. Good leaders are those who know what is right for the man under them. These leaders deserve the respect of every man. | B. Leaders cannot be judged easily. Many things go to make up good leadership. Most people fall short in some way or another, but that is to be expected. |
| (30) | |
| A. Leaders are needed more at certain times than at others. Even though people can work out many of their own problems, a leader can sometimes give valuable advice. | B. Some people need leaders to make their decisions. I prefer to be an individual and decide for myself, when possible. Most leaders won't let you do this. |

TURN THE PAGE OVER

6. Imagine that someone has found fault with you. Choose the response from each pair that comes closest to your feelings about such a situation. Indicate your choice by circling either "A" or "B".

When other people find fault with me ...

| Pair No. | | |
|---|---|---|
| (31) | A. It means that someone dislikes something I'm doing. People who find fault with others are not always correct. Each person has his own ideas about what's right. | B. It means that someone has noticed something and feels he must speak out. It may be that we don't agree about a certain thing. Although we both have our own ideas, we can talk about it. |
| (32) | A. I first wonder if they are serious and why they have found fault with me. I then try to consider what they've said and make changes if it will help. | If enough people point out the same fault, there must be something to it. I try to rid myself of the fault, especially if the criticizers are people "in the know". |
| (33) | A. They have noticed something about me of which I am not aware. Although criticism may be hard to take, it is often helpful. | B. They are telling me something they feel is correct. Often they may have a good point which can help me in my own thinking. At least it's worthwhile to consider it. |
| (34) | A. I may accept what is said or I may not. It depends upon who is pointing out the fault. Sometimes it's best to stay out of sight. | B. I accept what is said if it is worthwhile, but sometimes I don't feel like changing anything. I usually question the person. |
| (35) | A. I like to find out what it means; since people are different from one another, it could mean almost anything. A few people just like to find fault with others but there's usually something to be learned. | B. There is something to be changed. Either I am doing something wrong or else they don't like what I'm doing. Whoever is at fault should be informed so that the situation can be set straight. |
| (36) | A. I don't mind if their remarks are meant to be helpful, but there are too many people who find fault just to give you a hard time. | B. It often means that they're trying to be disagreeable. People get this way when they've had a bad day. I try to examine their remarks in terms of what's behind them. |

CHECK AND MAKE SURE THAT YOU'VE CHOSEN ONE MEMBER OF EACH PAIR (A TOTAL OF 36 CIRCLES).

# APPENDIX B

## ITI SCORING KEY

| | SYSTEM | | | SYSTEM | |
|---|---|---|---|---|---|
| Pair No. | A | B | Pair No. | A | B |
| 1 | 3 | 2 | 19 | 3 | 4 |
| 2 | 1 | 4 | 20 | 4 | 2 |
| 3 | 3 | 1 | 21 | 2 | 1 |
| 4 | 2 | 1 | 22 | 1 | 4 |
| 5 | 4 | 3 | 23 | 3 | 2 |
| 6 | 2 | 4 | 24 | 1 | 3 |
| 7 | 1 | 3 | 25 | 2 | 1 |
| 8 | 2 | 1 | 26 | 4 | 3 |
| 9 | 3 | 4 | 27 | 3 | 1 |
| 10 | 2 | 3 | 28 | 2 | 4 |
| 11 | 4 | 1 | 29 | 1 | 4 |
| 12 | 2 | 4 | 30 | 3 | 2 |
| 13 | 4 | 2 | 31 | 2 | 4 |
| 14 | 1 | 3 | 32 | 3 | 1 |
| 15 | 3 | 2 | 33 | 3 | 4 |
| 16 | 3 | 4 | 34 | 1 | 2 |
| 17 | 1 | 2 | 35 | 4 | 1 |
| 18 | 4 | 1 | 36 | 2 | 3 |